PERSONAL EFFICIENCY

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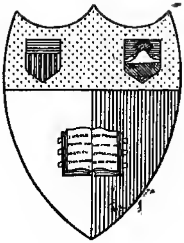

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LESSONS IN PERSONAL EFFICIENCY

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TORONTO

LESSONS IN
PERSONAL EFFICIENCY

BY

ROBERT GRIMSHAW

New York
THE MACMILLAN COMPANY
1918

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Set up and electrotyped. Published May, 1918.

PREFACE

There is little need for any more preface than merely to state that from the very beginning the publication of my lectures has been called for by those who heard them at the New York University and elsewhere. As they were very largely impromptu, and as the mass of notes from which they were delivered grew with each repetition, their publication as delivered has been impossible, but this *résumé* may serve as a useful reminder to those who heard the lectures, and a thinking point for those to whom I have not had the advantage of speaking.

ROBERT GRIMSHAW.

717 W. 177th St.,
New York, January, 1918.

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LESSONS
IN PERSONAL EFFICIENCY

LESSON I

INTRODUCTION

The word " efficiency." In the beginning let us be clear about what the word means. The man who would start out studying about arson, under the impression that it meant highway robbery, or housebreaking, would not progress very far on the road to knowledge of his subject.

" **Efficiency** " is a quality of mind, or of body, producing, or capable of producing, maximum result with a given effort, or a given result with minimum effort; akin to buying a maximum amount of goods with a given sum of money, or a given amount with minimum outlay.

Strenuousness vs. Efficiency. Efficiency is not only entirely unconnected with strenuousness, which implies a strain, but in fact is diametrically opposed thereto. The elephant is less efficient, although much more powerful, than the horse. Foreign missions are much less efficient than domestic, because they produce comparatively little result for a given outlay of cash, human life and effort.

Effectiveness vs. Efficiency. Efficiency is not effectiveness. A thing may be wonderfully effective or efficacious, yet not efficient. A medicine which is too powerful may be effective, but not efficient, because it does not "produce the desired result with a minimum of effort." Taking a line of trenches at immense and needless cost of life and munitions is "effective" in clearing out the enemy—but lamentably inefficient, because the desired result is not attained with minimum effort. One may remove a rock from the road which it blocks, by pulling it out of the way on a sled; it would be more efficient to use rollers, or explode a dynamite cartridge under it.

Capacity vs. Efficiency. Defined scientifically, we have capacity as "ability to receive, understand or accomplish; adaptedness to do; productive power;" whereas efficiency ("duty," the professional engineer calls it) is "the ratio of useful work, or of effect produced, to the energy expended or outlay made in producing it."

More concretely put:—

Capacity is ability to make or to do at a certain rate per time unit, as to turn table-legs, reap wheat, haul coal, deliver letters, make out bills, at a certain speed.

Inefficiency. To carry a loaded wheelbarrow on the head, as the negroes in Jamaica and the Italian women in New York do with ordinary loads, would be inefficient; so would letting its axle bearings get rusty, and pushing it.

Mental efficiency implies well-trained, well-exercised, well-balanced, well-co-ordinated brain, fed in proper quantity with rich red blood, and subordinated to a calm and cheerful soul and spirit. The mentally efficient man can handle ordinary brain problems at a reasonable rate, without effort, during ordinary working periods; and in emergency draw on his reserve mental forces so as to prolong and intensify his mental activity, without endangering his sanity or equanimity. As a rule, mental efficiency calls for a healthy body. "*Mens sana in corpore sano*" is a valuable possession, well worth striving for. The study of efficiency will help attain, keep and enjoy, both factors.

Mental efficiency is improved in the same way as physical—by systematic practise based on correct principles. But there is no way of improving general mental efficiency. One may improve the memory, for instance; but that does not increase the general mental power. Each mind faculty must be strengthened, and the manner of its application bettered; just as any one set of muscles can be strengthened, and the manner of their application improved—each set for itself. Thus, improvement of memory does not imply betterment of perception or reasoning; nor is there any system of mental education which will develop memory, perception and reasoning power at the same time.

Moral efficiency means more than mere adherence to commandments. It implies victory over self. It goes beyond the Decalog.

Muscular efficiency has to do with all the muscles, in connection with the framework with which they act. It is inconsistent with either much fat or a very lean bodily condition. It is essential that every man keep his muscles strong, uniformly developed and under control of brain and nerves, that he may serve and protect himself, his family and his country.

The muscles may be kept supple and elastic long after the bones are brittle; hence old people should avoid exercises or activities which might risk a heavy fall. Outdoor exercise is the best method of keeping the muscles efficient, and subservient to the will; but there are many "home" exercises which call for no apparatus, and keep the waist line down and the muscle efficiency high. While not every elderly man can be a Muldoon, all may profit by his teachings.

Physical efficiency calls for more than mere muscular strength or agility:—so-called "fitness." It refers to digestion and every physical function. It demands good teeth, stomach, lungs, heart, muscles, and all other parts of our complex and correlated or co-ordinated system. It tends to assist the attainment of a good condition of the entire physical system.

Commercial efficiency consists in getting a given profit with least possible expenditure of work, capital and time, and least risk. It may come from any one of the following factors:—

1. Organizing.
2. Planning.
3. Buying.
4. Selling;

or from a combination of any two or more of these.

Personal efficiency may be either moral, mental or physical. To attain a high standard in all three lines is difficult—but this very fact should inspire us all with the desire to commence early and strive long and hard to raise soul, mind and body to the highest level that time and opportunity permit.

Corporative efficiency (i. e., the efficiency of a corporation) depends not only on that of the individual units, but also on their perfect co-ordination. Thus our national government is far from efficient, because its units are changed too often and do not work in harmony with each other. There is duplication of activities in some cases, entire neglect of important functions in others. Our States have conflicting laws—for instance concerning marriage, divorce, inheritance, etc.

Latent efficiency,—that which lies dormant until wakened by some outside influence—probably exists in every normal person; indeed may be uncovered from the cloud which obscures it, in many instances considered as abnormal or only subnormal—as witness the development of the mind and body in "defective" children, caused by simply removing adenoids.

Active efficiency bears the same relation to passive as a machine gun in action to one all ready for service. It is the brain supplied with good red blood, trained to logical reasoning, and capable of retaining impressions, compared with one capable but untaught.

Passive efficiency is that which, while existing, requires the application of some external force to utilize it—for instance in a steam engine, a cannon or a bow. It cannot put itself in action, as can the mind.

Efficiency is usually only relative. The standard of attainment is generally capable of being raised—in the case of persons by effort from within; in that of the brute animals and of things, by forces acting from without. Thus the memory may be wonderfully improved; the range of cannon and the speed of race-horses has been raised by human effort acting along lines of principles based on records.

Absolute efficiency does not exist in things human. But the higher we aim, the more likely we are to attain a high degree of efficiency—always providing that we follow principles which have been shown to lead to higher and higher results.

Regular efficiency is that which has no seasons; no days nor nights; but goes on from time to time at the same rate—whether steady or regularly increasing. The essential is that it be unceasing and unremitting. The mill-stream which at one season overflows its banks and drowns the wheel, at another has to be helped out by a steam engine, may be powerful on an average, but cannot be said to be regularly or even generally efficient.

Symmetrical efficiency may be compared to that of a symmetrically developed human body, where there is absolute beauty and proportion among all the members—not as with the blacksmith, whose arms are unduly developed as compared with his legs.

Automatic efficiency is that kind which, once attained, goes on for itself without new guidance or impulse. It may be carried so far that it is inherited—for instance in the trotting horse. His gait is not natural but an improvement on that which he inherits—but the offspring of several generations of trotters have been known to trot without instruction.

Scientific efficiency is a term usually applied to the state resulting from organization and special investigation and research, coupled with vocational guidance. It is most often applied to manufacturing conditions. The term, as well as the science and art to which it refers, have been much used by both fakers and honest incompetents, particularly in America. The father of this science was the late Frederick W. Taylor. He and his disciples have done much to improve American efficiency and increase the well-being of American employers and workers.

Efficiency of production enables a manufacturing plant, for example, to produce at minimum cost for materials, labor, and general expenses; to enlarge or diminish its output according to the demand of the product; and to keep plant, organization as such, and personnel, unimpaired in both slack and rush seasons and periods.

Efficiency of supply refers to utilization of the time, money, muscular energy, etc., at our disposal, and which we cannot increase. In money matters it spells thrift, in contradiction to mere earning power. In the matter of time it means no unnecessary stoppages—no retracing of steps; no useless or hindering movements; so that we live to best advantage with the fixed income which all have from birth to death, of twenty-four hours a day.

Efficiency of quality implies getting out of soil, fibre, or other source, the best practicable and attainable quality of product; distilling the best elements and discarding the less valuable; raising the standard of purity and of excellence—but irrespective of the time, effort and money expended in attaining mere quality. It is usually incompatible with efficiency of supply.

Efficiency of use refers to the manner of utilizing one's supply of material, labor, time, money, physical or mental capability. Just as at table one man can eat a fish or a crab, and leave but little unedible material on his plate, while another will get only half the meat—so the man who shows efficiency of use will live better on $2,000 a year than another on $2,500 or even $3,000. Efficiency of use comes partly by nature, partly by training. It may be entirely distinct from stinginess on the one hand, extravagance on the other.

Efficiency of assignment differs from that of supply, quality or use; being a compound ratio showing the proportions between

1. The value of the product in a given unit of time, material or equipment, and
2. The standard value of the product.

The carpenter who in picking up or straightening a nail spends time worth more than the nail, shows inefficiency of assignment—unless it is the last nail available. The mechanic who from pure laziness uses a monkey-wrench as a hammer shows inefficiency of assignment, as the wrench not only does not do the work of the hammer well, but is liable to be sprung by the rough usage. But if it were a question of spoiling a good wrench, sooner than delaying a repair that might cause damage, or of losing more than its value in time going for or waiting for a hammer—then the efficiency of assignment would be good.

Partial efficiency might be compared with partial good health, or partial commercial solvency. Games at home and outdoor exercises should be chosen which will develop the entire body; courses of study selected which, while specialized to conform with one's occupation or personal bent, yet leave no mental faculty absolutely undeveloped. No muscle, moral fibre. or mental faculty should be allowed to get atrophied.

Compound or resultant efficiency is the product—not the sum—of two or more ratios; for instance where we consider efficiency of a steam plant as the resultant of those of the coal, the fireman, the boiler and the engine.

The aims of efficiency are various. They may be either creditable or the reverse. Their praiseworthiness has little or nothing to do with the degree of efficiency desired or attained. The aims may be either ethical or material; in either case either creditable or not. In general, the study of efficiency leads to cutting out wastes of time, money, material, and muscular or mental force.

Early difficulties, in efficiency study. Some find this study in the beginning dry and uninteresting, because they fail to see what is beyond the first investigations and definitions. But they will find that the theme unfolds systematically and symmetrically; that with each succeeding lesson the work will be more easy, the results more apparent. The study might indeed be compared to trying to pull open a drawer that offers stout resistance at first, but succumbs to repeated pulls and shakings, and at last—perhaps even before expected—opens suddenly and reveals the contents.

Efficiency study should be compulsory. The fact that there is a fool born every minute should lead to enactments to protect fools, by making them in some degree efficient. A fool is no more responsible for being foolish than a negro is for being black, or than I am for not being handsome, eloquent, or musical. Very often the fool knows that he is a fool—it having been borne in upon him by countless humilating experiences. Is it not as much Society's duty to protect him from crooks, and against his own weaknesses, as to inspect and treat the teeth of school children, and to insist that feeble-minded and cripples shall be aided?

How to attain efficiency. There is no one definite method of attaining any one kind of efficiency; much less, any one definite means of achieving all the kinds thereof. There are, however, some means which aid in attaining all kinds:—study, counsel, imitation and practice; each embracing many subdivisions and capable of many applications—even of several definitions, according to the application intended.

Results of attaining efficiency. These are many, various, and usually desirable. As a rule they are beneficial both to the one attaining them and to the community. For inefficiency means loss; usually, to the community or to some member thereof, other than to the inefficient person, corporation, or other causing it. And just as injury to one is apt to be harmful to all, so loss to one is apt to be loss to all.

Therefore everyone, no matter how efficient, should aid in raising the standard of those within his sphere of influence.

The measure of efficiency. Although efficiency has neither weight nor dimentions, it may be measured just as well as can those other weightless elements, electricity, and light—by its effects. Like the navigator's knot, it is a rate:—the proportion or relation between cause and effect, effort and result. A man, a thing, or a manufacturing plant, is 100 per cent efficient when no more result could possibly be got by the same effort; or conversely when a given effort could absolutely produce no greater result.

How to record efficiency. Measurement having been effected, or estimates made, where possible, the results should be recorded for present and future guidance and comparison. The records should be accurate, full, thorough, comprehensible, and comparable with others, whether present, past or future. Graphical records aid in rapid comprehension and comparison.

Comparison of efficiencies. The efficiencies of two persons or things can be compared only when they have been measured under the same or comparable conditions, and the measurements are expressed in the same or comparable units. Thus we could not compare the efficiencies of two cannons when the one was expressed in foot-tons, the other in muzzle velocity.

The zero man. The most pitiful thing that can happen to any man is to have it said of him as in the Bible of Jehoram, King of Judah, "And (he) departed without being desired."

The "zero man" has been described by the author of "Torchy, Private Sec." as "two ciphers on the east side of the decimal point."

The inefficient man has been described by Sewell Ford as "bright from the feet down."

What efficiency calls for.

1. Studying conditions
2. Recording the results of the studies in order to
    a. Do away with wastes
    b. Develop unused resources.

What wastes are to be eliminated?

1. Those of time
2. Those of space
3. Those of work (either mental or physical)
4. Those of money or its equivalent
5. Those of worry.

Effort and result. Efficiency is only attained when instead of great effort producing a small result, a slight effort will produce a great result. To express these two conditions as mathematical formulas:—
in the first case

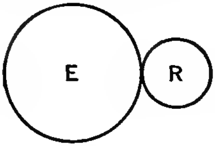
$$E > R \text{ or } R < E$$

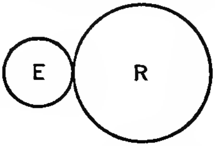
while in the second

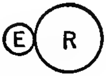
$$E < R \text{ or } R > E.$$

The proportions of effort to result in producing efficiency may be expressed better graphically than algebraically.

Here are three pairs of unequal circles. In the first, the one marked "E" is larger than that marked "R." That means, Effort is out of proportion to Result; and we have inefficiency. In the second pair, where Effort is proportionately small compared with Result, we have some degree of efficiency. The third pair, also, represents Efficiency, but although the circles are much smaller than those in the other pair, it represents a higher degree thereof. Now note that the first pair, although showing inefficiency, may also represent capacity or force. This emphasizes the distinction between efficiency and capacity.







At what age are we most efficient? This cannot be answered in general terms. There are both inefficient and efficient men of every age. Hindenburg and Joffre are proofs that Osler (now lecturing at 80) was wrong in asserting that men cease to be efficient at 40.

QUESTIONS 1 TO 20

The student should read the text over carefully twice, with at least twenty-four hours' interval, before answering these questions.

1. Give a short definition of efficiency.
2. What is the principle employed by jujitsu wrestlers?
3. How does a crack oarsman illustrate efficiency, as compared with a beginner?
4. Describe the difference between capacity and efficiency.
5. How do strenuousness and efficiency compare?
6. How is efficiency measured?

7. Under what conditions may the efficiency of two persons or two machines be compared?
8. For what does efficiency call?
9. What are essentials in records of performance?
10. What wastes does efficiency eliminate?
11. What are twelve factors in efficiency?
12. How may mental efficiency be increased?
13. Why should old people avoid activities which might risk a heavy fall?
14. What factors enter into physical fitness?
15. What factors tend to increase commercial efficiency?
16. How are military and naval efficiency attained?
17. Give an example of corporate inefficiency (preferably of your own knowledge).
18. What is scientific efficiency?
19. Whose name is most often connected therewith?
20. Give an example of inefficiency of production.

LESSON II

EXAMPLES OF EFFICIENCY

In the previous lesson I explained what Efficiency was, and what it was not; described the different kinds thereof; stated its aims, the method of attaining it, and the results of its attainment. To drive home some of the principles enunciated in these pages, let us examine some excellent examples of efficiency, worthy of imitation or emulation. They are in marked contrast with those given later of inefficiency.

Military and naval efficiency, which are intimately related, consist in achieving the desired result with the least possible expenditure of men, equipment, and cash; usually in the least possible time.

"What bearing has this on personal efficiency?" asks the caviler or the unthinking person.

Much. The efficiency of an army or other body of troops depends, when we get down to it, on the teeth and the feet of the individual soldier—on forces, ideals, a directive mind, attention, and almost all of the factors which I give as essential to purely individual personal efficiency.

Orchestral efficiency. In a well-conducted, co-ordinated orchestra of capable performers, each member is conscious that an error of commission or omission (especially the former) on the part of any one will result in discord instead of harmony. Each seeks to attain individual perfection in time, tone and expression, and perfect co-ordination with his fellow musicians, with absolute obedience to the leader. This calls for concentration of attention; memory; analysis of individual tones, and isolation of those from different instruments.

During a "rest" in his own score, each player must keep the "tact" or time beats in mind, automatically, so as to "come in" again at the right moment, to the fraction of a second. The leader must both analyze and synthetize effects. His attention must be concentrated on the score, unless supplemented or replaced by memory and habit.

Efficiency in housekeeping. The good housekeeper works according to a time-table and plan, figured out beforehand with reference to the various tasks to be performed, and the time, money and assistance at her disposal.

She saves much work and many a step, by attending to things promptly. When she leaves her bedroom in the morning she turns the bedclothes back to air them, while she prepares and takes her breakfast, instead of leaving the room untouched and wasting all the time during the morning meal. Before leaving the bathroom, she wipes around the washstand, so that work will not want much more afterwards. So elsewhere: if she "goes through the performances" daily she will always have a neat-looking home, not need to work to death on "house-cleaning day," and not have to excuse herself because her house "is in an awful state." All this work would not take more than a few hours; and she would be ready early to go out and order. (Most women "don't feel like working" after they have been out before the housework is done.) She should choose the food herself, not order by 'phone; for only an important customer can rely on really good wares ordered that way. Many a woman starts meals with table laying. She should first put on the fire all that has to be cooked or warmed; during this process she will find ample time to attend to the table.

The efficient housekeeper is through long before others, with much less to do and more means to do it with, have finished their task. The good housekeeper is through *on* time; the poor one only *in* time—an entirely different matter.

Efficiency in transportation. In the Welland Canal, barges which are too long for the locks are cut in two crosswise, the open ends closed by bulkheads, and the sections floated through separately, then rejoined for further towage. This is a good example of efficiency due to initiative, backing invention—(only another form of imagination), and is based on memory, which latter rests on association and attention. Still greater efficiency might be attained by building new locks, but only if the number of long barges would justify it.

See how all the personal efficiency factors which I will describe to you in detail dovetail into each other.

Efficiency in pig raising was shown in Louisiana, where two men selected litter mates eight weeks old. At the end of the fattening season one pig weighed 520 lbs., the other only 61. The expenses were respectively $15.54 and $5; and one sold for $58, the other for $8. This means weight in the proportion of 1 to 8; expenses, 3.11 to 1; selling price, 7.25 to 1. Thus, scientific raising can eliminate the notorious "razor-back" hog of our Southern States.

Efficiency in digestion. It is not enough to choose food which will be tasty and nourishing at little expense (there is plenty thereof and good variety thereof) but it should be eaten at such times, in such quantities, and in such order, that the stomach will not be overburdened. Brillat-Savarin's work "Physiology of Taste" shows how each course of a meal should enhance the digestibility of the one preceding it.

Efficiency of office appliances. An office appliance is efficient when it

1. can do all the work required thereof more economically and humanely than could be done without it;

2. can be kept fully employed;
3. prevents errors;
4. does better work than hand.

Efficiency in little things. So many more little things than big ones go to make up our daily life, and their sum is so much greater than that of the big ones, that it is just as well that we should make ourselves efficient therein, as that we should strive to be efficient in the great ones. A dozen two per cents are worth more than one twenty per cent, and usually more easily attained.

Gum a newspaper clipping on a page. Why apply gum first on the top edge and then on the bottom? Why not turn the slip upside down and with one stroke apply gum to the bottom of the clipping and to the place where the top will come?

Watch people opening and folding newspapers in the subway cars, where there is a strong draft. Most of them endeavor in vain to bring the paper around against the wind. "Once in a blue moon" you will see some one who takes advantage of the draft to turn and fold the sheet for him. Ask some one to sharpen a piece of blackboard "chalk"—(so called because there is not a particle of chalk therein, it being made of plaster of Paris and flour). After he has whittled away about a third of the length of the piece, trying to sharpen it by knife strokes from the butt towards the tip, take it away from him and sharpen it in four strokes, without wasting any material, by cutting from the center of the small end towards the butt.

These are but little things; but they mark the inefficient man as surely as does spitting against the wind, or getting out of a moving car by stepping backwards, brands the unpractical man. When one gets into the habit of asking oneself before putting a postage stamp on an envelope, striking a match, or opening a four-fold rule, what is the best way to perform the little task, the asking habit will grow; and there will be a great increase in efficiency caused by the sum of the time and motion savings both in the countless little things, and in the more important ones.

Efficiency is a matter of development. "By patience and perseverance the mulberry leaf becomes satin." In like manner, no efficiency can be attained by sudden methods or series of lessons. All that lessons and lectures can do is to point out how to find out what not to do, and the best way to discover by experience and counsel what is best to do. Fortunately, the rate of growth in efficiency gradually increases—so that progress, while slow and perhaps discouraging at first, becomes with time more rapid, satisfactory and profitable.

Increase of efficiency with practice. As a broad general principle, no one can expect a worker to do a certain task the first time as fast or as well as later. This is the result partly of study, partly of imitation, and in part of automaticity or habit. Confidence and contentment, also, exert their influence, as does the hope of fair and immediate reward.

Sources of efficiency. To parody a well-known quotation, "some men are born efficient, some attain efficiency, others have efficiency thrust upon them." The latter seem to be in greatest number; but the second class, composed of those who attain efficiency by their own efforts, whether or not aided by the suggestions of others, and whether or not inspired by the hope of fame or reward, is the one from which most is confidently to be expected.

It is not alone what a man eats, but what he digests; not what he digests, but what he properly allocates among his various members and organs, that makes him strong; not alone what he allocates, but how he uses the structures built up in the system, that makes him efficient.

Examples of inefficiency. An excellent and well-known way to teach anything is by giving an "awful example." Temperance advocates understand and apply this. By pointing out faults, lacks, weaknesses, and discrepancies, men and things may be improved. I give here a number of more or less glaring examples of inefficiency in various lines, hoping that they may "point a moral and adorn a tale."

Are we Americans inefficient? A popular slogan of the British people in general, and of the British soldier in particular, in this war, is "Are we downhearted?" The answer is a thundering—and truthful—"No!" Now if some one should start the query in America "Are we inefficient?" the answer would probably be as resounding and as general a "No"—but it would not be truthful, by several long shots. We are inefficient actively and passively; inside and out; in agriculture, finance, manufacture, navigation, inland transportation, sanitation, education, government and war. Our young men have recently achieved a certain degree of efficiency in the line of "spitballs" and the like. But we have not yet reached the efficiency of the Japanese in a method of reducing to black and white marks the sounds of our language, nor of the French in evolving an easily remembered and applied system of weights and measures. The North German peasant, with a poor soil and nasty climate, raises forty bushels of wheat to the acre right along, while we think twenty from fertile farm land good. Almost every chimney in this country is vomiting good combustible. Our children die at an alarming rate of purely avoidable disease, or are killed by automobiles run by drivers whom inefficient legislation and administration fail to control. Our daily newspapers cannot even make the spelling of proper names (let alone the text) in their headlines, agree with what stands below. Our banks can no more control speculation than our local government can stamp out prostitution. And so on all along the line:—

Then: "Are we efficient?"

NO!

Are we Americans economical? Or do we manufacture and keep on manufacturing, at a loss? Take the average farmer. He starts with a young pig weighing 100 lbs. and feeds him until he weighs 250 to 300. The pig constitutes a factory for transmuting corn, mash, or slops, into pork. When he has reached a weight beyond which he cannot go, does the farmer sell him? Not a bit of it. Instead of saying as in Schiller's "Fiesco"

"Der Mohr hat seine Pflicht getan,
Der Mohr kann gehen,"

he keeps on loading the pig with raw material from which nothing comes but rather poor manure.

In France they do things better. My friend Decauville, for instance, used to buy all the lean kine he could, weigh each, put a zinc tag marked with the weight, on a horn of each, and feed each animal each day one-tenth its weight of spent sugar-beet slices. Twice a week, each beast was weighed; when two weighings showed no further increase in weight, it was sold, because it would not pay to feed into it one more pound of fodder.

Physical inefficiency. Those with general interest in the welfare of the human race teach us that we are inefficient even in breathing; that parts of our lungs are seldom or never visited by the life-giving oxygen of the air. So we are advised to breathe deeply and slowly, to make our lungs efficient; which again leads to increased capacity and efficiency of brain, nerves and muscles. We are physically inefficient from top to toe. The New York policemen were shown to be flat-footed and weak-footed; so were the girls of Oregon University. (Yet in Washington there seems to be no "putting down the foot flat," when cause comes.) Our young men are flat-chested (military training would better that) and some of the old ones too flat-headed.

No middle-aged man should have the right to take his wife or his daughter in his lap, unless he can pick her up and carry her, in case she faints or sprains her ankle.

In 1915 the U. S. Marine Recruiting Bureau in New York City received 11,012 applications for enlistment, but only 316 were able to pass the physical examinations. That ciphers up to only one in 35; or 2.87 per cent. Not three out of a hundred, physically efficient! The examiners were probably inefficient as well, refusing many who would have been good marines.

Agricultural inefficiency. America averages only sixteen bushels of wheat per acre. Forty should be raised without difficulty. Germany is now doing it, on poor soil and in an unfavorable climate.

Either we plant unprofitable varieties, or we sow such kinds and at such times that the product comes all at once, and cannot be marketed to advantage.

Mining inefficiency. Our coal-mine owners are about as uneconomical of our "black diamonds" as our lumbermen of our forest wealth—as witness the immense "culm" piles in the mining districts. And the miners say—I know not with how much truth—that too many mines have been opened out; that if all were worked, four hours a day would supply the entire demand of this country.

Lumbermen's inefficiency. Our forests are disappearing because we do not replace the trees which are felled, and do not even take care to cut them close to the ground—so that from ten to twenty per cent of the lumber is wasted. Also, we fell full-grown trees so carelessly that they destroy young ones in falling.

Manufacturing inefficiency. Our manufacturing is done inefficiently because we do not use our waste or by-products—some of which are worth more, if properly utilized, than the so-called main products.

We wait for a foreign war which upsets our entire textile industry, and hampers almost every other, before we turn about and make benzine and toluol from waste products that have been escaping for the last fifty years. We delay until the supposed sole supply of potash has been cut off, before we look around us. Then we find that we have potash in abundance:—it only requires to be extracted.

We have been importing nearly $120,000,000 worth of chemicals per year. Dr. Thos. H. Norton says that we could make most of them ourselves without any difficulty. But we are satisfied to "let George"—or rather Wilhelm—"do it."

Military and naval inefficiency. Not satisfied to elect a base-ball player as member of our legislative body, we put him on the Committee which has to determine of what our army shall be composed. There is not one branch of either army or navy in which we are efficient.

Inefficient representation abroad. Our diplomatic service is usually bad enough; our representatives being chosen with no regard to ability or experience. But our consular service is a laughing stock among the nations. A life insurance company which would appoint its representatives abroad on such a plan (or lack of plan) would soon be in the receivers' hands.

Judicial inefficiency is so common that about one-half the decisions of the lower courts, when appealed, are reversed by the courts above. Think of the time and money lost to the American people by this fact alone.

Legislative inefficiency. About the only thing in which our legislators have proved themselves efficient is in their excellent understanding of the subject of pork.

Inefficient enforcement of the laws. It is said that the best way to get rid of a bad law—Heaven knows we have bad laws innumerable—is to enforce it. Yet how many of our local or other laws, either good or bad, are enforced? It required the "Evening Telegram" to bring about the extirpation of the "hand book men" in New York. It needed an explosion that shook three States to call attention to the non-enforcement of the laws concerning storage of explosives in the neighborhood of large cities. It was only the outbreak of a pestilence that brought about the enforcement of the laws in connection with garbage disposal. And so on, all along the line.

Physicians' inefficiency. And our physicians—"legitimate" and "illegitimate"? There are too many whose diplomas to practice are merely licenses to kill. It is absolutely impossible, in the few years now demanded, and with the limited facilities for study and clinical work offered by many of our fresh-water colleges, for a young man to gain there sufficient knowledge of the diseases and accidents, the remedies, appliances, and operations, which now go up to make the practice, and should form the study, of a competent physician.

Railway inefficiency. Our transportational facilities are inefficient in that while apples were selling at $8.50 a barrel in New York City, they were rotting on the ground in-orchards only forty miles away. We have no proper methods of and facilities for distribution, discharge and return of cars. As a result, we are now (January, 1918) all "balled up" with foreign and domestic fast and slow freight, shipped without inquiry as to whether or not there was the slightest chance of the cars reaching their destination, or being unloaded promptly on attaining it. And no coal in Manhattan!

School inefficiency. That our schools are inefficient is shown by the letters every business man receives in reply to an advertisement for employees of a kind from whom ordinary good spelling and grammar should be expected.

Servants' inefficiency. And now to touch a tender spot:—the problem of domestic service. Why a cook should know less of housekeeping than one not supposed to make a specialty of kitchen chemistry—namely, her employer—is a mystery. But when confronted with such facts as one recently coming to my knowledge, where the living expenses of a family of two adults and two children were cut in half when the servant left and the wife had to do the cooking and the housework, instead of the latter only—this "must give us pause."

Surely our women could get together and provide schools of housewifery for the domestic class, and frame a system of treatment of trained servants, which would reduce the burden of the day, imposed on the modern housewife of moderate means. There are still servants who inquire "how lang shall I cuke the poinapple?" and others who even say "Ah'm suah dem aigs orter be soff; Ah biled 'em twenty minnits."

Rich and poor women's inefficiency. The reason why so many rich women are mentally inefficient is, that their minds are in the same condition as their backs and their ankles; having always been protected and supported, they have neither stiffness nor elasticity. The women have always worn mental as well as physical corsets and high-laced boots, and have no back-bone in their character.

On the other hand, most poor women are inefficient in their mental make-up because their minds, like their bodies, have been insufficiently nourished and exercised. They are mentally and morally anemic.

Missionary inefficiency. In many lines of activity we get little return for our work and outlay. But among all, few will compare in inefficiency—this is in the unsatisfactory ratio between effort and result—with our foreign missions. We are like a man with a farm miles in extent, who sends his workmen out a day's journey to reach each field, instead of cultivating equally good and more important fields within stone throw.

Inefficiency of theatres. Our theatres are highly inefficient. True, the *reg*ular drama has been supplanted by the *leg*ular. But think of the uplift effected by the new dances! I remember "The Beggar Student" staged with a Norwegian village instead of a Bohemian, and the actors in the Mikado clad in Chinese costumes; and one of the characters in *Les Miserables* pressing an electric door-bell button in the end of the 18th century. But these are mere details. That great draftsman who, given five dots placed in any relative position could use them as points for the human head, hands and feet, is outdone by the "movie" scenarists who can introduce into any play at all, cigarette lighting, telephoning, revolver drawing, a pet dog, and one or more automobiles.

Inefficiency in coal consumption. We have only to look at the ash cans which line our pavements, long after they should have been emptied and put away, to see that in nine out of ten apartment houses the coal is not only chosen injudiciously—as evidenced by the quality of ash and clinker—but burned inefficiently, as indicated by its quantity.

Inefficiency of public boards. As an example of how a public body can have been very inefficient, Mr. Kingsbury detailed methods in force by which it was possible in 1914 for the New York State Board of Charities to care for a daily average of 2,063 more persons than in 1913, "without a dollar's addition to the budget." Among the means employed was reducing the size of prunes fed to the hospital patients, raising $10,000 worth of pigs from garbage which in earlier administrations would have been thrown away; saving $7,000 a year by buying green instead of roasted coffee, and introducing Argentine beef to take the place of the higher domestic dressed beef.

Inefficient city planning. "Laying out" cities and towns has become a science—but only after most important American cities had been so badly planned and laid out than any great improvement is impossible. New York is just ninety degrees out of position. Its arrangement of long and short blocks is precisely what it should not be. In the eleven miles of Manhattan's length there are only about eleven avenues for north-and-south communication; these being 800 feet apart; but the island is unnecessarily cross-hatched with east-and-west streets at only 200 feet intervals. In consequence of this ridiculously impractical arrangement, we cannot build enough subways, surface, elevated and super-elevated roads, to give adequate transportation even to the centre of length of Manhattan Island—to say nothing of the Northern end.

Inefficient house planning is the rule, rather than the exception. The housewife, who is—or should be—at home nearly all the day is never consulted. Result: lost time and steps, and uncomfortable and expensive dwellings.

Housekeeper's inefficiency. Are our housekeepers efficient? They are the best judges of canned goods, ever. But I am inclined to believe the story of Mrs. Newly Wed, who when the butcher asked her how many ox-tongues she wanted, replied:—"Oh—about a dozen or so."

Inefficiency in choice of food. Our workingmen are complaining and striking because "they cannot live on their wages." As a matter of fact, nine out of ten could live much better on much less money if their wives knew enough, or cared enough, to buy food that would at once be tasty and nourishing. Information on this head is to be had merely for the asking—yet they continue to show an "efficiency of use" of 40 per cent, or even less.

"We do not eat veal because it is cheaper than other meats, but simply because we like it and are willing to pay for it. Besides this, about two-thirds of the calves that come to market for slaughter are from the dairy breeds, such as the Jersey and Guernsey:—little-weight animals that no sane feeder would put a pound of feed into, because he couldn't hope to get weight enough back from it to pay for the feeding. That class of animals are milking-machines pure and simple. The dairy men, after keeping enough of the calves to replace their old cows, are forced to get rid of the rest, and the most profitable plan is to dump them on the market for veals." *Technical World Magazine.*

Inefficiency in letter writing. If we want to borrow a knife, we don't say to the owner "My dear Mr. X, will you please lend me your knife? I remain, dear Sir, Very truly yours, Y. Z." We say at most: "Mr. X, will you please lend me your knife?"

Then why put the "Dear Sir" and the closing phrase, on a letter? And why say: "I have received your letter of Nov. 12th and in reply would state that so-and-so?" "Replying to your letter of Nov. 12th" covers the ground. It could not be replied to, unless it had been received.

The same principle applies all through ordinary letters, particularly on business.

Typewriters' inefficiency. Are our typists efficient? To judge by the one in a certain "efficiency" office, who wrote me "Appreepo" of something or other, I would answer "No." (The letter was signed by the head of the department in question.)

National wastes. The United States outlay for medicines amounts to $500,000,000 per year; 80 per cent of this ($400,000,000) being without physicians' prescriptions. This last amount is more than the cost of the Panama Canal.

"Inefficient population." Some one put the question to a management missionary "What would you do where you found the entire population inefficient? You could not fire your labor. They would get their pay and then take two or three days off." The answer was evasive. It practically amounted to the fact that "it was a job for the mover." For all that, few cases are hopeless. There is in all Sodom at least one righteous man; in every community there must be some one who has not mental *beri-beri* or hookworm disease, and can be used as an experimental guinea-pig for the rest. In fact, I cannot conceive of any factory not having had to close its doors long before the whole population had become inefficient; because perhaps the management itself was partly responsible.

Inefficiency in trifles. Some persons put on the left glove first, strike matches lengthwise of the box, and in a hundred other ways show that they pay no attention to the little things of this life—therefore are most likely to be inefficient in important matters.

But the left hand is less capable than the right, and any gloved hand less so than the same one, ungloved. And the right hand being usually a trifle larger than the left, while both gloves are the same size, the right glove fits the more tightly of the two. Now, why handicap the naturally least capable hand still further, artificially, and then assign it the more difficult task?

In the matter of the matchbox—every time that a match is struck, part of the prepared striking surface on the box is destroyed—so why ruin a long streak thereof, when a short one will serve?

No doubt you do, or at any rate have done, many such petty things the wrong way. Now I want you to analyze the first ten things you do in the morning. You will probably find that in at least eight you are making too many motions, taking unnecessary time, or doing them the least efficient way. If this is the case with petty things that you have done thousands of times without noticing that you have done them inefficiently, is it not likely that important ones—all of which may be analyzed into a great number of simple ones—have not also been so done? The analysis is worth making —commencing on the least complicated, and leading up to the more complex and important.

Losses by inefficiency. Some of the "losses" by inefficiency are losses to one individual yet more or less corresponding gain to some other person or persons. Thus if in wagoning coal, five per cent is spilled on the road and gathered up by some poor person, there is no absolute loss. If in reaping a field five per cent of the grain is not garnered, but four-fifths of this is gleaned by several persons, we have a loss of five per cent to the owner, a gain of four per cent to the gleaners, and absolute loss of what is not gleaned.

The principal losses, however, from inefficiency, are absolute. No one benefits by them any more than by the black smoke arising from imperfectly (i. e., inefficiently) burned fuel. In the United States alone these losses amount to billions of dollars a year. Brandeis says that American railways lose a billion dollars annually by inefficiency. While there are no data for such a precise statement, it is probably not overdrawn.

How to detect inefficiency. Often, inefficiency reveals itself to the observer; less often to the inefficient corporation—municipal, governmental or other. But as we detect very slight deviation from the vertical by the use of a plumb line, from absolute planeness by a straight edge, so, inefficiency may be detected by the application of standards of measurement, with due reference to the recognized or desired standards of attainment. And just as we would not expect a street pavement to be nearly absolutely flat as a planer table or a printing-press bed, we must not expect or even hope to see as high a percentage of efficiency in an ordinary bookkeeper as in a C. P. A. (Certified Public Accountant.)

QUESTIONS 21 TO 40

21. Give an example of inefficiency of production?
22. Of supply.
23. Of use.
24. Of quality.
25. Of assignment.
26. Of housekeeping.
27. In transportation.
28. Of office appliances.
29. In American military matters.
30. In American naval matters.
31. In little things, from your own personal knowledge.
32. Are Americans efficient?
33. Give an example of American extravagance.
34. Why have so many women weak ankles?
35. In what do American farmers show inefficiency?
36. In what are our mining industries inefficient?
37. Our lumbermen?
38. Our manufacturers?
39. What proves our judges to be incompetent?
40. Our schools?

LESSON III

FORCES—ATTENTION

In the preceding lesson you have considered enough concrete examples of collective and other efficiency and its lack—all due to personal efficiency or inefficiency—to confirm you in the belief that something must be done if America is to hold her place in the sun; if her citizens (especially the coming generations), are to have a sufficient share of the desirable things of life, attained by a reasonable amount of exertion, instead of by strenuousness and its resultant fatigue and premature exhaustion.

We will now take up in due order twelve factors which make for efficiency. Some, while essential, call for but little explanation and study; others, again, from their very nature, demand and are worth detailed consideration, not only of their own elements but of their relations to most if not all the others.

The forces at our disposal are mental, moral and physical; human, and what we call the forces of Nature. They may act on

1. Ourselves
2. Others, or
3. Purely material objects.

They may be either partially or wholly within our control. Some are limited, other inexhaustible.

Human forces comprise, among others:

Judgment
Will
Memory
Habit
Perception
Invention, etc.

Some of these are prime forces producing results; others, results of such forces; some, at times one and at times the other. Some—as perception—while primary in relation to other human beings, or to material objects, may be only secondary in reference to their effect upon oneself.

Nature's forces, as the direct, like wind and wave, and the indirect, like fuels, are known to all.

Ideals are conceptions of what are

1. High
2. Admirable, and
3. Desirable to attain.

They may be

- A
  1. Major, or
  2. Minor
- B
  1. Practicable, or
  2. Impracticable
- C
  1. Legitimate, or
  2. Unlawful
- D
  1. Praiseworthy, or
  2. To be condemned
- E
  1. Clearly defined, or
  2. Vague.

Major ideals furnish the main spring to one's aspirations, teachings and actions.

Minor ideals may

1. Help in attaining the major,
2. Hinder their attainment, or
3. Be merely neutral in this regard.

Practicable ideals are such as are possible to be carried out:—as freeing the slaves.

Impracticable ideals are impossible or nearly so of attainment—as founding a colony of educated persons in which each shall do his or her share of the menial work. (Some call them "castles in the air.")

Legitimate ideals are in consonance with moral, statute, or conventional laws. Some things, while not contrary to moral law, are illegal—(for instance, in some States, marrying one's deceased wife's sister).

Vague ideals, like will-o'-the-wisps, lead nowhere. We should have only such ideals as are clearly defined, in the mind at least; preferably recorded in detail, with a properly planned method of devotion to their attainment.

Ideals vs. Prejudices. Some ideals are merely prejudices—based on no real reason. Many a supposed ideal of one person is merely a prejudice in favor of some one thing which another person would ridicule or avoid.

Aim. Even the most clearly defined ideal can be attained only by the help of a guiding mind, acting on the force or forces at one's disposal.

Aims of cities. Even a city may have an aim; although most cities have none. New York aims at commercial, Boston at intellectual, Detroit at industrial supremacy.

Development of ideals occurs either

1. Unconsciously, through example, or
2. Purposely.

In the first case, environment plays a great part on young and old; in the second, will, as a function of the directive mind, is the main spring.

The directive mind does for the forces at our beck, what the driver, following the trainer, does for the horse. Undirected forces are as dangerous to their possessor and the community, as wild horses.

The man with the directive mind is called a leader. He may either

1. Assume direction, as did Napoleon, or
2. Receive it by acknowledgment and appointment, as Saul or Lincoln.

The directive mind calls for either

1. Natural directive ability, or
2. Training in the science of direction; or both.

This course of lessons is intended to aid, among other things, in such training.

Training gives the directive mind, however naturally able,

1. Breadth,
2. Promptness,
3. Accuracy.

Sensations are "direct feelings of things or of bodily conditions"; the impressions that we get entirely or partially through our various sense organs, as distinguished from what we think when none of these have any influence upon our thoughts. We may have the "sensation" of light or of sound, or the "sense" of sight or of hearing. We cannot study the subjects of attention, concentration, and perception without thoroughly understanding our sensations, and the senses through which we get most of them.

Sensation may be either

1. Pure (uninfluenced by former experiences) or
2. Elementary (not analyzable into more simple ones).

Our " senses " tell us what is going on without us; in some things, what is taking place within us. Our personal capacity and efficiency—our well-being and safety depend on them and our use thereof.

All animals need their senses for purposes of bodily

1. Upkeep,
2. Protection,
3. Defense.

Man, in addition, employs them in

4. Mental development,
5. Moral uplift,
6. Pleasure,
7. Social life.

The number of senses is not five, as usually reckoned, but eleven, as under:[1]—

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[1] In a diseased state we may lose one or other of Nos. 7, 8 and 9.

1. Sight,
2. Hearing,
3. Smelling,
4. Tasting,
5. Feeling,
6. Appreciation of temperature,
7. Appreciation of weight,
8. Appreciation of resistance,
9. Appreciation of movement.
10. The static sense,
11. The sexual instinct.

The skin's four senses are

1. Mechanical,
    - *a.* pressure,
    - *b.* pain,
2. Thermal,
    - *a.* appreciation of heat,
    - *b.* appreciation of cold.

The static sense enables us to balance and stand. Its organ is in the ear. If the semi-circular ear canals are injured, we cannot stand straight, if at all. Because of this sense we get giddy, or sea-sick.

Organic sensations, the organs of which are unknown to us, give the sense of hunger and thirst.

The sense organs give us "special" sensations—that is, those not connected with digestion, respiration and muscular movements. They are

1. Those giving sensations proper, as
    - *a.* taste.
    - *b.* smell.
2. Those giving more nearly intellectual percepts, as
    - *a.* touch and the muscular sense,
    - *b.* sight,
    - *c.* hearing.

The child's intellectual senses are developed in this order:—

1. Touch,
2. Sight,
3. Hearing,
4. Taste as such (not nausea),
5. Smell.

Sight, our most valuable sense, should be protected and developed from childhood up. Defective sight cause school headaches. All children's eyes should be examined often, that their efficiency may not be hindered in development.

Eye efficiency, for instance in estimating lengths, distances, etc., may be developed by practice.

Determining colors by touch is an impossibility. One might as well expect to tell tones by the tongue or the finger.

Color blindness is more frequent than usually supposed. Everyone is slightly so—for instance in a retinal band about the centre of the eye, red and green cannot be seen, and just outside of this, only black and white can be distinguished. If one is color blind, it is either to red or to green; never to both.

Sailors' proverbial long sight is a fiction, except in so far that no short-sighted man can be a sailor. Following the sea does not "lengthen" the sight.

The "movies" are injurious to the best of eyes, particularly when the films are old and scratched.

The hearing is often deficient. Parents should have their children's ears examined, and hearing tested. The ears should not be cleaned with hair-pins or the like. When an explosion is expected, the mouth should be held open to avoid rupture of the ear drum.

Smell is of use in enabling us to detect the presence of decaying substances and many poisonous gases—particularly of modern illuminating gas. The most frequent cause of its defectiveness is nasal catarrh, which should be the object of a physician's care, as soon as detected.

No dentist could ply his profession if his sense of smell were not sensitive.

Touch is more sensitive in women and girls than in men and boys. In many occupations delicate touch is an advantage. This sense may be deadened by games or occupations which thicken the skin of the finger tips.

The senses cannot be sharpened. No more than we can add a foot to our stature, nor widen the space between our eyes, can we sharpen any one of our senses. We can only train them. The difference between actually sharpening and training them might be expressed in terms of a rifle, the bore of which we cannot alter, but the accuracy of our aim therewith—that is, our efficiency in its use, and the effectiveness of the piece itself—we can improve by research, imitation and practice.

The hygiene of the sense organs is said by Pyle to be of the greatest importance. "A child without any sense organs would not have enough mind to quarrel about."

The value of attention. Little that we do can shut out the stimuli exerted by the external world on our sense organs. We may close our eyes, turn our head, or plug our ears; but can hardly stop smelling, and not at all cease feeling. If we could not direct and control our consciousness so as to prevent all those stimuli which do not interest us for the time being, in what a muddle would our mind be!

Before taking up "trained attention," we must touch on sensation and the senses; and later on, perception (too frequently confused with attention).

The reason for this preliminary study is, that attention is possible through selection, direction and control of our consciousness; that we may

1. Employ this or that sense at will, and direct it to a desired object;
2. Decide what we shall hear, see, think or do.

To be precise:—within certain limits we may direct our attention to the appearance of a noisy object, without noticing its noise, or the converse; perceive an inconspicuous object or a slight or a low sound, to partial or entire exclusion of a larger or more brilliant object, or a louder or shriller noise. Within certain limits, also, we can concentrate our thoughts on one thing or idea, to the exclusion of others. That is, we may "attend" or "give attention" to certain things or thoughts at will—at any rate, up to a certain point. Beyond that, the conditions may be fixed by other persons or happenings; and it is essential that we know the limits of our selection and control.

To secure continuous attention, there must be unity in diverse subjects; i. e., the mind must apply to the thing or the idea observed, the ideas already obtained in the same general field. This makes for mental, as opposed to mere ocular attention. "Attention can be kept fixed only as it is kept moving" says McLellan most aptly.

If one is not entirely under the influence of either

1. Habit,
2. External stimulation, or
3. Habitual thinking processes

one can as above mentioned, decide what to see, hear, think, or do; i. e., to what to attend, to what to give attention. Fortunately this is so. When not the case, one is either subnormal, insane, or idiotic. When so in high degree, one is more than usually aided in being mentally, morally and physically efficient. If one's attention is readily distracted, one is partially inefficient, despite all other mental gifts.

What is attention? It is will function; and has been called "the better half of all intellectual power." If we compare consciousness to a telescope, attention is change of focus. It calls for

1. Concentration on some one object,

2. Shutting out all others.

Attention is

1. Intense consciousness,
2. Direction of the mind to
    - *a.* an object,
    - *b.* a sensation, or
    - *c.* an idea.

According to Bergson, attention is

1. Positively, an adaptation of the body,
2. Negatively, the inhibition of movement.

Attention means either that

1. Some part of the mental state is focal and predominant, or
2. Some prominent idea crowds out all others.

Overstrained passive attention becomes monomania.

Attention is produced by repetition; often used for over-persuasion, as in selling. Once attention is fixed, interest is easily secured.

Kinds of attention. Attention may be either

1. Non-voluntary, (involuntary; spontaneous; passive; reflex; stimulated; the result of feeling; from an external stimulus) or
2. Voluntary (active, the result of effort or will; from an internal stimulus).

In the first case some stimulus is necessary; in the second, there is mental effort. We may indeed divide the first sort into

a. Non-voluntary or neutral.
b. Involuntary or compulsory.

Attention may be classified in three other ways, according to

1. The kind of accompanying feeling (non-voluntary, or involuntary),
2. The reason why a certain thought or feeling predominates (native, or acquired, or: immediate, or derived),

3. The nature of the object (intellectual or sensorial).

Voluntary attention (also called "active") is definitely self-initiated; calls for effort, and resists interruption; as where Archimedes kept his mind on his studies during the sacking of Troy. Very young infants do not possess it. Hypochondriacs lack it; they cannot concentrate their mind on other things than their real or imaginary ailments.

Three laws of voluntary attention.

1. The will can bring together mind and object; but interest is necessary to force attention;
2. It can compel or exclude interest in any object, sensation or idea;
3. It is lessened by involuntary attention.

It comes from internal stimulus, and is lasting; while the involuntary proceeds from external stimulus, and is only temporary.

Non-voluntary attention (also called "spontaneous") while effortless, is not against our will; as where we "lose ourselves" and require an effort to direct our attention elsewhere. Between voluntary and non-voluntary attention the line cannot be very sharply drawn.

Non-voluntary attention calls for interest, which may be either

1. Natural or
2. Acquired.

Natural interest depends on quantity and tone of sensations. The brighter the color, the louder the sound, the greater the natural interest.

Acquired interest comes from either

a. Familiarity, or

b. Novelty.

Absolutely new things often puzzle us, producing a blur in the mind; when familiar they impress themselves and awaken interest. On the other hand, very constant familiarity dulls the impression. But neither familiarity, nor novelty in itself, interest; only their connection.

For instance, hearing our own language or seeing our own national flag in Persia, or hearing Persian or seeing the Persian national flag in America, would attract attention and arouse interest.

Involuntary attention is against our will—as where the slam of a door intrudes itself upon the thoughts, and takes the attention unwillingly from a speaker's voice, or a flash of lightning "distracts the attention" from a microscopic investigation.

The mind may be drawn by a sight, away from a sound or a touch, or the converse.

We must learn not merely to direct and concentrate our attention on the desired object, but to *keep* it there, despite occurrences tending to distract it. Inability to control the attention is fatal to personal efficiency. Suppose a bookkeeper could not keep his attention on his columns of figures, but had it distracted by every little noise in the room, or even by being spoken to when at work. "The deaf adder stoppeth up her ears," must be, for him, a reality.

Laws of involuntary attention (such, for instance, as refer to advertisements, signs, attractive clothes, alarm signals, etc.) Within certain limits:

1. The attractive force of the stimulus varies with its quantity;
2. Change (especially increase) of stimulus arouses attention;
3. The attractive force varies directly with its powei of producing,
    - *a*. pleasure, or
    - *b*. pain.

Native attention, as where a child follows a soldier in uniform and does not see the landscape, is always involuntary.

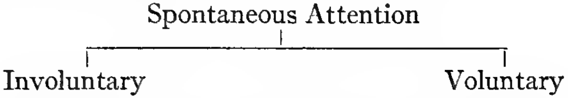
Acquired attention, as to a book, or a stock quotation, may be either voluntary, or involuntary.

Immediate attention, as where a child is attracted by a gold watch, is hard to distinguish from derived, as where his father admires its excellent workmanship.

Sensorial attention is that directed to a thing because of sense.

Incidental attention is where the prominent object is an image, meaning or concept—as patriotism.

The relations of the three forms of attention are shown in this diagram.



Voluntary attention may be based on non-voluntary, as where one is attracted involuntarily by a gay flower, and ends by studying it scientifically, with reference to an end. It can, however, create no new material.

The activities of attention are

1. Adjusting,
2. Selecting,
3. Relating.

Attention as an adjusting activity. "An empty mind cannot attend to anything; a mind empty in a given direction cannot attend in that direction." (McLellan.) A chord is heard; the mind is unprepared for music; a second chord follows—the mind is then "set or adjusted for sound"; next, it takes in the music.

Attention as a selecting activity. The mind, once prepared or directed, in general, selects exactly that thing or idea upon which it should be concentrated. If the adjustment is "asking questions of the future," the second step is the selection of the proper material for the answer. No two men see the same tree. The artist sees its beauty; the carpenter its use; the lumberman its money value; the physician the medicinal value of its parts or products. The small boy considers it as a source of nuts or fruit; the surveyor, as a landmark.

Attention as a relating activity. Ideas may be associated either as regards place or time, or (i. e., externally) or as meaning (i. e., internally) and voluntary attention seeks to discover the internal or hidden relations between them; to classify, for instance, all natural objects into animal, vegetable and minerals; then to sub-classify these groups by examining each component, for agreement with or difference from, the others.

QUESTIONS 41 TO 60

41. What are the principal forces at our disposal?
42. On what may they act?
43. What are the various kinds of ideals?
44. What is your highest ideal?
45. Is it the same that you had five years ago?
46. How did Napoleon become a leader?
47. Lincoln?
48. Name three other leaders of men, of the twentieth century.
49. How did each attain leadership?
50. What is sensation?
51. Name our various senses.
52. In what order does a child acquire intellectual senses?
53. In what occupations is color-blindness a bar?
54. What is the most frequent cause of defective smell?
55. How can we sharpen the senses?
56. Define attention.
57. Name the different kinds of attention.
58. What increases natural interest?
59. Give an example of involuntary attention.
60. What are the activities of attention?

LESSON IV

ATTENTION

In the third lesson we learned the twelve factors most essential to personal efficiency; and having devoted a short time to three of them—the forces, the ideals and the directive mind—gave as much time as we had to commencing the consideration of one of the most important, namely, attention.

These factors were not named in the order of their importance, but in logical sequence; and attention ranks high in importance among our mental functions. We found it necessary to distinguish three sorts, voluntary, non-voluntary, and involuntary; and gave the laws governing the first and the last of the three.

We will now continue with this important factor; with its attendant elements, interest, concentration and perception: and incidentally I want to lay particular stress on the paragraph showing the relation between attention and memory, which latter is a topic to which an entire lesson must be devoted.

After each paragraph I want my readers to consider just what application the statements or laws can have in his own life and that of others with whom he is thrown. And I want each to make, where possible, other illustrations than mine.

Five factors of subjective attention, as stated by Pillsbury, are:

1. The idea in mind,
2. The purpose or attitude,
3. Earlier education,
4. Expression of social or individual ideal (duty),
5. Heredity.

The idea in mind. If we are thinking of a person or thing, we notice him or it more readily than otherwise; we can pick out any one face in a crowd, if we look at it; or any one tone in a piano if we watch the key which produces it. A puzzle picture of the "where is the soldier?" character in a landscape can hardly be missed, once it has been found. If one expects coffee and gets tea by mistake, the latter does not taste like tea, unless the change is noticed beforehand.

The momentary purpose or attitude. The influence of this factor is seen where a particular question is asked —for instance, where a number of pieces of paper of different colors, sizes and shapes are shown, and one is asked what colors were there, the forms, sizes and number will not be noticed (although "seen"); but if the shapes are called for, the colors, sizes and numbers will not attract the attention (although "seen"). The question may be self-put, as where one "wonders if it were raining" and then sees minute raindrops that had preciously been unnoticed (although "seen").

Ask any one at 20 minutes past four, what time it is, and he will not notice whether the figure on the watch is 4, IIII or IV. Ask about how the four is represented, and he will not notice what time it is. After a strong odor is noticed, other odors are more readily perceived.

Education as influencing attention. Education has two effects on attention:—

1. To make certain kinds thereof more effective, and increase the observing capacity,
2. To determine what stimulus shall be noted.

Thus: while neither the sense of smell nor that of taste may be sharpened, the attention may be trained to note smells or tastes that at first made no impression.

If one is accustomed to noticing tastes, sights, sounds, etc., in general, for a purpose, the attention is more readily attracted by any one of them, than otherwise—

although the senses, as such, are not sharpened by practice (and cannot be). One's own name and language attract one's attention more readily than another's.

Social determinants of attention. Appreciation of social approval, or of the reverse, may determine attention to something difficult or unpleasant which may lead to a desirable result—as where one studies law instead of reading novels, or dissects a corpse without noticing a pretty girl standing by.

Heredity and attention. Among the influences of heredity are those where music, fighting, or a picture, attracts the attention of one whose parents are respectively musical, military, or artistic.

Inherited characteristics compelling attention may be either

1. General,
2. Family, or
3. Individual.

All inherit a likeness for stories of love, adventure or fighting; some inherit one for music or painting.

Nervous processes and attention. Education tends to make certain nervous paths easy to travel.

Objective conditions of attention. The outer-world conditions influencing our attention by the effect on our sense organs, are various; among them

1. The intensity of the stimulus,
2. Its duration,
3. Its steadiness.

Intensity of stimulus. A loud noise attracts and holds attention better than a low sound; a bright light than a faint one; a blow, than a touch; a stink, than a faint perfume; a bitter taste, than a flat one.

Duration of stimulus. Up to a certain limit, the greater the duration of a stimulus—as noise, or light—the better it attracts attention; but prolonged stimulus leads to neglect. For this reason, change of kind or intensity is a feature; the *crescendo* opening or the *diminuendo* closing tone of a siren blast is more effective than a steady tone; a blinking light than a fixed one of the same intensity; a moving object than a still one. (This is an important feature in advertising.)

The duration of attention is limited. It is only in pulses. The mind cannot be fixed steadily on any object or idea, but attention must be renewed by repeated impulses. For this reason we cannot keep the eye fixed more than about two seconds on any one point in a picture, but must constantly "aim it," as it were. Any attempt to listen uninterruptedly to the ticking of a clock for 20 seconds will fail; the eye must be redirected every two or three seconds. The exact period of duration of attention varies.

It is said that genius is the faculty of constant and uninterrupted attention; but this is only relative.

The range of attention. We can attend to but one thing at a time. Where there are two or more objects, each must have the attention focussed thereon separately. Where, however, there are four or five, each of which can be "taken in" in a fifth of a second, we can combine them in a group. Perhaps we "perceive" them by mental photography, after having "seen" them. Also, we can do two or more things at a time, if one is automatic. But any difficulty in carrying out the automatic action will result in failure to do the voluntary one at the same time. Thus we may whistle and read simultaneously; but if the reading becomes difficult, the whistling will break; or if the lips get dry, so as to interfere with the whistling, the reading will be interfered with until the whistling can go on automatically.

Inattention probably does not exist. Except during sleep or a fainting spell, there is no complete cessation of attention. What we call "inattention" is really attention directed to something else than the wished-for thing or ideas, through either

1. *Scattered*, diffused or dispersed *attention*, as where several things or ideas occupy the attention rapidly one after the other, or
2. *Absent-mindedness*, where the attention is concentrated on some one thing or idea.

The "diffuse" kind is more common in childhood; the second in maturity, especially with persons having trained minds.

Dispersed attention is never complete except when we are unconscious. It is rather *fading* attention. We can always comprehend some one part of the field of thought, somewhat clearly, while the rest is blurred.

Divided attention is usually a strain, and results in imperfect comprehension, accomplishment, or enjoyment.

Attention is almost essential to memory. Inattentive people have bad memories. Vivid consciousness implies long memory; faint consciousness short memory; entire lack thereof, no memory at all. The importance of attention in the matter of personal efficiency lies in the fact that while our mind can spring rapidly from one activity to another, it cannot be engaged in two kinds at once. In "absence of mind" one impression eliminates the possibility of another which might otherwise attract the attention. The rage of battle distracts the wounded soldier's mind from his pain.

One of the best attributes of genius is the power of prolonged concentration of the attention upon one impression.

Laws of degrees of attention. The intensity of attention depends upon

1. Mental and bodily freshness,
2. The strength of the stimulus,
3. The prior direction to a certain stimulus.

Obstacles to attention are either

A. Physical, as
    1. Weak physique,
    2. Unsuitable external influences.
        a. noises, especially if varying,
        b. conspicuous objects, especially if in motion,
    3. Impure air,
    4. Strained position; or
B. Psychical or mental, as
    1. Connected with the person.
        a. sluggish temperament,
        b. vivacious temperament,
        c. mental state.
    2. Connected with the object.

The movements in attention are interesting to note. In giving attention to anything visible, the eyes turn thereto automatically, with proper adjustment as regards lens focus and muscle convergence. Usually, the same may be said concerning attention to sound and touch. Further, attention is apt to be accompanied by stoppage of voluntary movement; and when intense, the breath is held and the heart beats are more rapid. Sometimes the brows are wrinkled, the jaws set, the fists clenched.

Attention awakeners. Among these are:

1. Hope, as of
    a. reward,
    b. approval.
2. Fear, as of
    a. loss,
    b. disapproval,
    c. punishment.
3. Emulation.

Division of mental labor is desirable. For instance, in preparing an address the attention should be concentrated on the argument and arrangement, before the words are chosen and written. What is to be said should engage the attention, before how to say it is "attended to."

Attention and will. "No idea can dominate our movements," says Angell, "which does not catch and hold our attention. When we can keep our attention firmly fixed upon a line of conduct, to the exclusion of all competitions, our decision is already made."

This is one reason why in these lessons so much weight is laid on trained attention; because no one can be efficient whose will is weak; and no one can have a strong will, unless he can select and control his consciousness, or in other words, "fix his attention," "concentrate."

Concentration has been called "the first step towards conscious power." The more liberally educated, the more liable we are to have our attention diverted by trifles. In teaching tricks to an animal, the great difficulty is to keep its mind on the exercise in question. The brighter the animal the more difficult this is. This teaches the desirability of studies in this direction. If Leonardo da Vinci, one of the greatest and most versatile geniuses the world has produced, had had concentration, he would not have made so many failures, and kept behind him so much unfinished work—the great horse on which he worked intermittently for six years without finishing it; the "Mona Lisa," which he left without eye-brows, etc. Michelangelo, not really his equal, supplanted him in public estimation, because he had concentration.

Developing concentration may be effected in various ways, more or less simple, and some of the most effective of which seem trivial until analyzed. The well-known Robinsonian methods are as follows:—

1. Pointing with outstretched leg or arm at a given mark. (By no means easy for many.)

2. Balancing a stick on finger or head. (Loses its value in time, as it becomes involuntary.)
3. Playing letter games (word making) which increases speed, also.
4. Reading a book upside down; counting the number of lines read per unit of time. As this number increases, concentration is developed.
5. Writing with both hands. (Or, writing or drawing with the eyes fixed on a mirror in which the work is reflected.)
6. Describing accurately an object which has been observed for a short time. (Strengthens the memory, also.)
7. Detailing a number of objects which have been exposed only for a short time. (More a memory exercise than one for developing observation.)
8. Counting up to 100 slowly, with the eyes constantly fixed on one spot.
9. Following with a pin the second-hand of a watch.
10. Striking out a given vowel from a column of printed matter, of which the contents are unknown. (The time required to strike out a given number should be tested from time to time, and should diminish with practice).

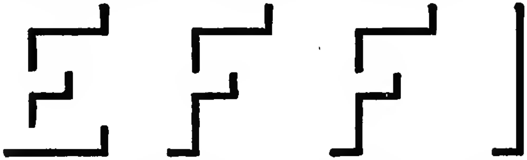
To keep a thought alive, we must keep on doing something with it. Thoughts cannot be kept dully directed, any more than the eyes can. We must not only get busy but keep busy, mentally, if we wish to maintain the attention directed to any one thing or idea.

Perception and attention. We must distinguish between these two important factors of personal efficiency. In fact, we cannot be efficient unless we understand clearly the meanings of the word expressing those factors.

We have considered sensations and the senses, and the ability to concentrate our thoughts on things or ideas at will; we now take up "images" and "percepts," and the functions of perception, as distinct from seeing, hearing, etc.

Images are mental representations of things not actually noted by any one or more senses at the time. Largely dependent on the will, they rise and subside gradually.

Percepts are vivid presentations of external objects actually noted at the time by one or more senses; are largely dependent of the will, and appear and disappear rapidly. They are "sensations plus memories, aided by association and recall." This explains many optical illusions; as for instance in the letters here given, where the faint outlines are supplied by the perception; or where we see "Esqr." and read "Esquire."



An ellipse seen edgewise appears, also, elliptical, but narrower in proportion than it really is. Here we need both memory and judgment to enable us to perceive whether the object represented is really circular or elliptical. But memory and judgment aid us in the case of four ellipses seen under a wagon; for we know at once without taking any time to reason it out, that elliptical wheels are never seen under a vehicle, except very rarely under a freak affair at a circus or the like.

Just as where we see "Mr." and read and understand "Mister," we probably see "Mist." or "Mstr." and read and understand the full word. For this reason, those who make headlines hurriedly for the daily newspapers often make bad breaks. In one case they put "Vanderbilt" for "Vaudeville" and in another "100,000 for "10,000."

Perception is concrete, dealing with things. "Perceiving" is getting a right idea of an object by correction of the impression made by the senses. Thus, when we see a circular table obliquely, so that it makes in the eye the impression of an elliptical form, we "perceive" that it is really circular. In the same manner we "perceive" a cube, no matter from what direction seen, to have six equal sides and only right angles; although the image in our eyes may have no two sides equal, and show no right angles.

The recognition of a caricature is a good example of perception. Although the picture is not accurate, by association and memory the observer translates it into terms of correctness.

We may "see" things for years, yet not "perceive" them:—as an example, the blood vessels in our eye, which we perceive only by moving a light at one side of the head, although they have been pictured on the retina, from birth.

Perception is focussing in only one relation a thing which we see in a background of many such. Thus two persons may see an automobile; one perceives that it is his brother's, the other that it is a Packard. Three see a dog; one perceives that it is a spaniel, the other that it limps, a third that it is lost. In each case there are two impressions, or an impression and an idea; in each there is a relation. There may be relations of time, color, size, weight, and any number of other kinds.

Perception and concentration. While *per*ception deals with particular cases (we *per*ceive a particular relation) *con*ception deals with the results of generalization; (we *con*ceive the quality or relation as common to more than one case). In conception there are no impressions, as in sensation and perception, which have, respectively, impressions of sense and of relation.

Perception and habit. In one sense, fully developed perceptions are habits. But while the most perfect habits are unconscious, our perceptions are conscious; so that after first seeing and then perceiving an object, (as a door knob) we may come to see and use it without noticing it.

Sensation is	**Perception is**
A simple mental state.	A complex mental state.
Presentative only	Presentative and representative.
Difficult to recall.	Easy to recall.
Passive.	Active.
A simple form of feeling.	A form of intellect.

(Dexter and Garlick.)

Perception and sensation differ in two ways at least:—

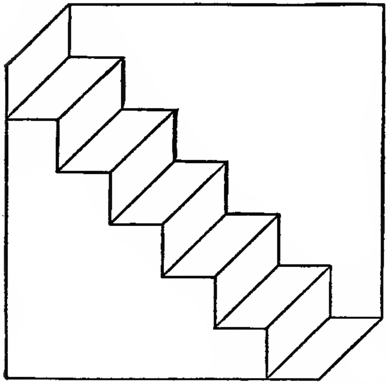
1. We must add memories to sensations, in order to perceive;
2. The "percept" explains the new and the old sensation, and the memories of the same and similar objects, whether or not the new sensations are like old ones from the same thing.

Essentials to perception. There can be no correct or complete perception without

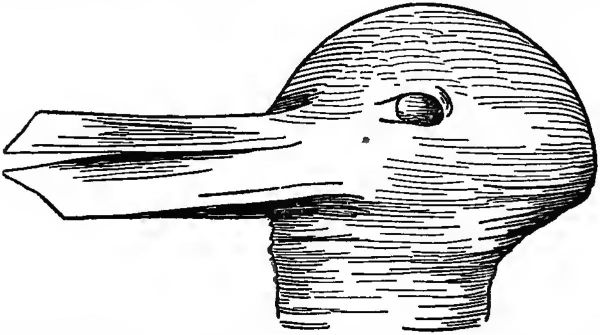
1. Sensations,
2. Memories,
3. The laws of association and recall (which will be taken up later, in full, under the head of Memory).

Try to repeat a sentence in an unfamiliar language. The resultant failure will be due to the fact that the sound sensations are not supplemented. See sketch on next page.

Is it a flight of steps, or a cornice? Look at the annexed duck-head. Or is it a rabbit's? It is whatever you think it is!



Perception calls for experience. Otherwise, if we looked at a table, a chair, or an automobile, we would see it, but not recognize it to be such, unless we saw it at exactly the same angle as on previous occasions. Our experiences enable us to re-form in our minds the present mental image; our memory of our experience with the object in question, or somewhat similar ones enabling us to make proper mental adjustment. Otherwise we would not recognize our own house if we came upon it the first time from up the street, instead of down. Of course, without memory, perception is more difficult; in some cases impossible. One remembers, for instance, that every circle seen at an angle appears elliptical; and from the fact that wagon wheels seen



obliquely have always proved to be circular when viewed full on, as well as from the reasoning that elliptical wagon-wheels would be useless, the mind reads correctly what the eye sees.

QUESTIONS 61 TO 80

61. What are the five factors of subjective attention?

62. How can you most easily pick out the tones of any one instrument in an orchestra ?

63. How does education influence attention?

64. Would one loud horn blast, or two medium low ones best attract your attention?

65. Would a steady blast, or one increasing and then diminishing in loudness, best attract attention?

66. What is the advantage of flashing electric signs?

67. Name two things that you can do at once.

68. Under what circumstances would you do one of them less perfectly?

69. Is the object of an advertisement to *at*tract, or to *dis*tract, attention?

70. How long can you keep your attention fixed on a small point in a picture?

71. What is the connection between attention and memory?

72. What movements or poses are indicative of attention?

73. Name three attention awakeners.

74. Three attention distracters.

75. What is the connection between attention and will?

76. What is concentration?

77. Name a great genius who would have been greater if he had been able to concentrate his efforts.

78. Name three ways, of your own invention, of strengthening the power of attention.

79. How would you choose, among several monkeys or dogs, the one most likely to learn tricks well?

80. Is the tuneless whistling now so prevalent among young New Yorkers compatible with concentration?

LESSON V

PERCEPTION

Common properties of all objects. All objects have two common properties:—*time* and *space*. Space perception has two factors:

1. Perception,
2. Distance; which latter has two subdivisions:—
    - *a.* distance on the sense-organ's surface,
    - *b.* distance therefrom.

We know just where we touch the arm, although we do not know how we know it. It is not sight, because we know just where we touch the back of the neck, which we cannot see. Distances on the skin's surface are probably translated into visual distances, and perhaps conversely.

Pillsbury thinks that the reason why we overestimate vertical distance and underestimate horizontal ones is, that the eye muscles are not so readily adjustable vertically as horizontally.

A hole in one's tooth seems larger to the tongue than to the eye. As regards distance from the eye:—a single point of light, when the only thing seen, affects the retina in the same way, no matter what the distance.

The factors in estimating distance are eight:—three physiological, five psychological; the first being connected with eye adjustments. Near objects put most strain on the eye muscles. There is also more strain on the lens muscles; and we see more of the right side of the object with the right eye and more of the left side with the left eye; this difference increasing as the distance decreases. Increased distance also blunts the clearness of the image. The apparent rate of movement of objects of which we know the real rate aids; as does the apparent displacement of objects when we move the head laterally.

Comparative distance is shown where one object hides the other in part. Shadows help; as where the light shines from back of the observer, the heaviest shadows are furthest. With **one eye** we cannot estimate distance.

We can thus increase our power of judging distances by taking advantage of a knowledge of all these facts. Thus psychology makes for efficiency.

Perception of motion is aided by

1. The eye,
2. The ear,
3. The sense of touch.

Visual perception of motion. The eye recognizes motion of other objects than itself:

a. by noting relative changed position between two observations;

b. by seeing the change take place—probably by after images on the retina. The eye's own motion is recognized by apparent change in the position of external objects.

Aural perception of motion. The ear recognizes distances and direction of sound; the former by comparing it with the normal intensity when close, if this is known. Lateral direction is recognized by the differences of intensities in the two ears. Direction up and down cannot be recognized when the sound comes from directly in the line of the nose.

Time perception. Time is measured by rhythmic changes, as of the heavenly bodies; by vibrating springs and pendulums; and by flow of liquids or semi-liquids. Time units of less than four seconds are measurable approximately by strains of unrelaxed expectations; larger ones, particularly of past time, by multiples of standard events filling them. Empty time seems long while passing, short when past; busily-employed time short in both cases. In youth, "time flies," because most events are interesting; in old age the reverse is the case.

Training perception consists in learning to see in familiar objects new details, qualities and uses. Thus: once we learn to analyze any flower, we perceive not only in it, but in every flower, something more than mere appearance and odor. Once we have learned to run and repair a "flivver" we perceive in every other automobile details that formerly escaped our perception, although we may have "seen" them a thousand times.

Perception must be trained. When trained, it adds greatly to the subjects, personal efficiency, by widening his field of knowledge, facilitating his mental processes, and saving his time. It must be trained in connection with attention.

The scout, the detective, the artist, the musical conductor, the physician, the weather prophet, attain proficiency largely by training their perceptive faculty.

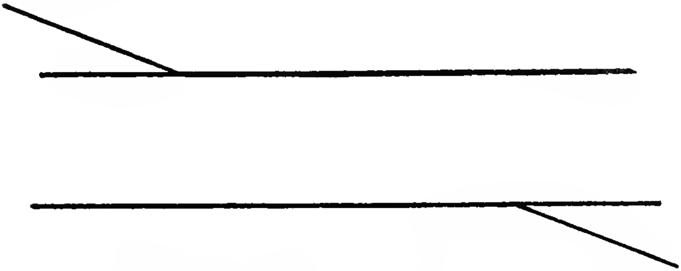
Perception as applied to reading. If we read properly, we do not see letters or words, but only parts of them, or some of them; filling out the blanks. The eye makes a series of snap shots; perhaps three to six of this line. We do not see all that is taken in at each shot; if we did, misprints would bother us constantly in newspaper reading. Our memory supplies the omissions.

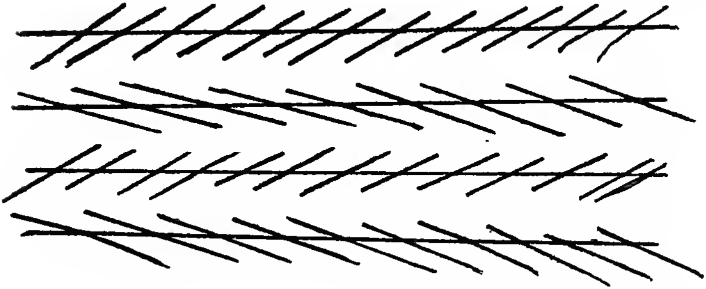
Three methods of reading may be distinguished:—

1. By letters,
2. By words,
3. By "sense" or context; supplying omissions by memory.

Thus while *l*, at the beginning of an English word is not apt to suggest the next letter, at the end it usually suggests *e* or *y*. In reading German or French, one letter will suggest a different companion from what it does in English. Our word "lead" has two meanings as a verb, and one as a noun; yet memory and experience give us at once from the context the proper pronunciation and meaning.

Optical illusions, which are due to false suggestions, show that perception is due to adding meaning and recall to sensation. The sensation suggests the wrong memories or ideas because of either





1. Close associations, or
2. Wrong context or setting.

Examples of the first are shown where we underestimate small angles and overestimate large ones; because we are used to seeing right angles distorted by perspective, and the mind works backwards with this idea.

In the first of the annexed figures, the direction of the diagonal lines is falsely perceived; in the second, that of the parallel ones. A line divided by cross lines seems shorter than one of equal length, undivided.

Hallucinations, which are most frequent in the insane, call for no object. They may be caused by an after image in the eye, or by imaging in the ear.

Observation is looking at an object as a whole, closely, and taking in its details. It is both "a series of connected acts of attention" and "regulated perception"[1] or "that prolonged perception which the attention directs towards a determined object."[2] It is the process concerned in such sciences as geology and botany, where we deal with effects, rather than with causes.

When a child draws, from normal originals, an armless man or a five-legged cat, or attaches the arms and legs wrongly, that is the result of defective observation.

Observation may be described as:

1. Connected acts of close attention,
2. Prolonged and regulated perception.

Unlike experience, it notes effect only; or if it notes both cause and effect, cannot influence either.

Tests of observation. Ask first yourself, then others in whose efficiency you are interested, or who are interested in their own, questions like the following:—

How many ribs has an umbrella?

How many lace-holes in your shoe?

What is the height of a flour-barrel, marked on the wall?

Of a horse's head, including the ears?

Of a top-hat?

How many feet long is this room?

At about what cross street does No. (715 Broadway) come?

---

[1] Sully.

[2] Compayré.

What is the color of your (partner's) eyes?

Which ones of our American presidents have worn beard or moustache of any kind?

How many keys on your type-writing machine?

At what position in the height of the human head do the eyes come?

Where are the four letter-boxes nearest your house?

What is the peculiarity of a negro's nails?

Of his palms?

Does a donkey bray "Ee-haw," or "Haw-ee"?

How does a cow get up from a lying position?

A horse?

How are the herring's fins placed?

What is the difference between human eyes and those of the lower animals?

What is the peculiarity of the cat's pupils?

The goat's?

On what side of a woman's clothes are the button-holes?

Are there buttons on the back of the coat you are wearing?

What is the difference in the placing of the limbs on a pine tree, and on an oak?

Are your upper and lower teeth placed exactly in line over each other, or "staggering"?

What is the color of the cars on the (42nd St. cross-town) line?

What feet does a horse move at the same time, in trotting?

What are the distinguishing "ear-marks" of a Ford automobile?

Which way do the cleavage planes run in a block of ice?

Which one of printed lower-case (small) letters is between *m* and *l* in height?

Which is your second longest finger?

Which arm do you put in the sleeve first in putting on your coat?

Which end of your collar do you button first?

Which shoe do you put on first?

How many petals has a geranium flower?

Research and investigation. The child receives its earliest information as to the physical qualities of objects, by investigation with fingers and tongue; and when he can talk, follows this method by asking more or less sensible and useful questions. If he did not, he would wait long for information concerning persons and things!

Time and motion studies. These are applications of analysis and synthesis. Studying any given operation for the purpose of saving unnecessary time and motions, we divide it into a number of stages or periods, and record

1. The number of motions made in each;
2. The time required by each.

We then, usually, seek to

1. Lessen the number of motions,
2. Simplify each,
3. Shorten the time needed for each.

We may, however, find that we have to

1. Use an entirely different set of motions,
2. Lengthen the time of some, to get greater accuracy and co-ordination.

How speed is attained. This is usually by performing each motion slowly, in order to analyze it more easily. This process is akin to learning to write legibly and rapidly, by commencing slowly and deliberately.

Trades especially needing time studies. While almost every manual occupation is susceptible of speeding up, printing and plumbing need it especially. Doubters should see how many unnecessary motions even skilled workmen make, how much too long they take, and how much unnecessary pause between them.

Results of time and motion studies. Bookbinders have their speed in folding increased four times, bricklayers, after having cut out 13 motions from a total of 18, have laid three times as many bricks per day, without getting any more tired than under the former and usual inefficient method.

Steps in motion study. These are six.

1. Reducing the present practice to writing,
2. Enumerating the motions used,
3. Enumerating the elements which affect each motion;

Next, after all the desired changes are made:—

4. Reducing the practice improved to writing.

Then repeating 3 and 4 for the fifth and sixth steps.

Examples of motion studies. The typist should learn to place letter heads in the rack in such a position that they may be put in the machine head downwards and face to the rear, without reversing, and envelopes with the flap forwards and downwards. Where paper and envelopes are kept flat in a drawer, the sheets should lie face down and head to the front, and the envelopes face down and flap front.

The bricklayer should experiment so as to save stepping backwards and forwards and turning half-way around for each brick; and should so pick up the bricks as to avoid turning them over to spread and place them.

Competent counsel as the result of investigation. Solomon said twice "In the multitude of counselors there is safety"; but One wiser than he said: "If the blind lead the blind, they shall both fall into the pit." When our watch goes wrong, we go to a watchmaker, not to a cobbler, to have it fixed; when our "inwards" misbehave, we ask a doctor's, not a tailor's, advice; and if our information suffices and our means allow, we select the most competent man in each occupation (preferably a specialist).

There is a proverb "the man who pleads his own case has a fool for a client." This does not shut out the fact that there are fool lawyers and crooked lawyers; but as a rule the proverb holds good.

"This man, I say, is most perfect, who shall have understood everything for himself after having advice what may be best afterwards and unto the end."

Competent counsel can be secured by

1. Observation of self,
2. Observation of others,
3. Consultation,
4. Instruction,
5. Reading,
6. Study.

Where to seek counsel. We take counsel from:

1. The present, including its trend towards the future,
2. The past.

Its sources may be:

a. Man,
b. Books and other records,
c. Events.

Our counselors should

be	*have*
Successful themselves	High standards
Up to date	Experience in special fields
Honest	Common sense
Sympathetic	High ideals

How to choose counselors. Solomon's dictum is not to be considered opposed to the proverb: "Too many cooks spoil the broth." The first means (to quote Scripture) "prove all things, hold fast that which is good." The second advises against mixing systems; pulling in two different directions at once.

Calderon, in his "Medica de Honra" says:

> "*Dicen, que el primer consejo*
> *Ha de ser de la mujer.*"

(Freely translated: "They say that the best counsel is that of woman.")

Parental counsel. Some parents express annoyance when their children ask questions. But how in the name of common sense can the average child of the average parent find out anything worth while on this planet, if he does not ask "why?" How many parents volunteer to tell a child anything of importance; even to answer his question in good English when a reply is vouchsafed?

One of the first lessons a child should be taught is to ask not only his parents but other "grown-ups," and to ask himself, "why?" It is surprising of how much ignorance parents must convict themselves, before an intelligent child's "why's?" Once in a while comes an unanswerable question, such as "where do the yesterdays go to?" but a parent should thank all the Powers that he has a child intelligent enough to think of such a thing, and to ask such a question.

If this be the case with children, it is doubly so in relation to adults, and especially to employees. They should be encouraged to ask their fellows, their superiors in position, and above all themselves, the "why" and the "wherefore" of every action; should supply themselves with a double font of interrogation points, and use them for their own benefit and that of those for whom they are working.

It is the "why" men, like Newton, Franklin and Harvey, who discover the law of gravitation, the identity of electricity and lightning, and the circulation of the blood.

We profit by others' experience. It is not merely in virtue of our own height that we observe our surroundings, but by means of the height of that upon which we stand or climb. So in the matter of efficiency; we have the advantage of the warnings of those who have preceded us, what not to do; and of the hints, what to do and how to do it to best advantage. We profit by the records and standards of those who have gone before us.

"The wisdom of the dead." We are told of Japanese loyalty to the wisdom of the dead. But it is not that which has brought the island people to the front; for the Chinese are even more loyal to the underground—and see where they are! We must remember Bernadotte's reply, on being twitted with being of low family—"I am an ancestor!" We pay too much unconscious reverence and tribute to the wisdom of the dead; too little to acquiring new wisdom from those about us. We should strive to accomplish something to which those about us and those who follow will point with appreciation, and adopt as standards.

But while disclaiming excessive "loyalty to the wisdom of the dead" we must take due account of other nations' loyalty to that ideal. Our own formation is not yet complete enough for us to attempt reforming ancient peoples who had civilization, culture and literature when our ancestors were naked savages streaked with red and yellow paint.

One's own experience as counselor. We can make the best use of our own experience as counselor by recording it in such shape that it can readily be referred to. Ehrlich's great remedy "Salvarsan" was the last of his 606 experiments in that line. The amateur fisherman remembers what baits are best for certain fish; what kinds and times of day are most favorable; then why not in his daily life use his experience therein as guide?

Example. Those who wish to succeed must base their actions as far as possible on others' successes and failures; learn from them what to do, and what to avoid; more than this, why imitation, and avoidance of imitation, respectively, are to be recommended. Centuries ago, Terentius wrote of another: "I bade him look into the lives of men as though into a mirror, and from others, to take an example from them." History itself was defined by Milton as "philosophy teaching by example." Burke said example was the school of mankind, which would learn at no other.

Terentius says: "This is a wise maxim:—take warning from others of what may be to your own advantage."

The force of example. Unfortunately, just as disease is more catching than health, bad example is more influential than good. One bad apple in a barrel will spoil its neighbors; but I never heard of ten good ones improving one rotten one. We cannot alter this sad fact, but may take advantage thereof by cutting out positive faults before we attempt introducing positive improvements. We must weed before we sow or plant; search out and eliminate our own weaknesses before attempting to add to our assets of mind, character, or physique. We must compel those for whose betterment we are responsible to get rid of their bad habits, before attempting to implant any positive traits.

Analysis and synthesis have direct application with respect to memory; for the thing to be memorized should

1. First be read or heard with attentive mind, and interpreted by the learner's store of knowledge; then
2. Be gone over again,
    - *a.* making the various parts definite (analysis) and
    - *b.* getting them in their mutual relations (synthesis).

Analysis, or dissection into separate members, is applied to actions, to discover prime causes; to natural products, to enable us to imitate them by synthesis; to work and play, to see if we can cut out unnecessary motions or delays, and supply any omissions. We overcome intellectual difficulties by analyzing and dividing them. Analysis enables us to use to better advantage the forces at our disposal, by learning their various capabilities and limitations, one by one, and applying the former in the best way.

Analysis is applicable with good result in agriculture, salesmanship, law pleading, manufacturing, commerce—in fact every human activity.

In analyzing a thing or an idea, we seek to inspect each of its component parts independently of the others, after separating it therefrom. Analysis calls for infinite attention to and examination of details. It is laying stress upon one or more parts of the whole which is being examined. It is the converse (not the reverse) of construction. (The reverse of *con*struction is *des*truction.) Analysis clears up mental conditions.

We analyze the motives employed in work or play, to see how many elements there are, and learn if any may be eliminated, combined, or differently arranged; or if there is a lack which we may supply. Analysis of the fall of an apple by gravity enabled Newton to discover and announce the law of universal gravitation. Analysis of the factors governing the movements of projectiles gave the baseball pitcher the "spit ball."

We analyze actions to discover motives or prime causes; natural products, to enable us to imitate them by artificial synthesis.

The reason why. Analysis enables us to find out the reason why a process is successful or unsatisfactory, by taking each element therein and seeing what it does, and what it does not effect, both of itself and in relation to every other element in the same process.

Synthesis is the converse of analysis, being constructive. It aims at ultimately looking at the whole of a compound thing or idea, without little or no attention to the component parts. We "put two and two together" in logical reasoning. If our synthesis be correct, we get four; if incorrect, we may get five, or even twenty-two.

Attention, memory, and thinking in general, make use of both analysis and synthesis. Both are applied equally in investigating the forces of gravitation and those governing the aeroplane flight.

Both may be either mental or physical.

Synthesis of results. The chemist effects various combinations of different elementary or compound substances to produce entirely different ones. We may do this:—

1. In the way of research, in the hopes of either
    - *a.* obtaining something new, that is useful, beautiful, curious or instructive, or
    - *b.* discovering some new law;
2. For manufacturing purposes; in this case not working blindly or at haphazard, but relying on memory, or still better on records, principles or formulas.

By synthesis the monk Roger Bacon, having experimented with various materials, re-discovered gunpowder, which the Chinese had known for centuries.

Classification is combined analysis and generalization.

Both analysis and synthesis are valuable. The attainment of any degree of mental efficiency calls for the knowledge and application of the principles underlying these two mental functions. We can do no good planning, recording, scheduling, or despatching, without analyzing the elements of all matters under consideration at the time, in connection with the problems to be solved. And so on along almost the entire line of factors going to make up efficiency of any kind; we must "go to the bottom of things."

"Seek, and ye shall find."

QUESTIONS 81 TO 100

81. What is perception?

82. Which do we estimate the more correctly:—vertical or horizontal distances; and why?

83. Name three of the factors which enable us to estimate distances.

84. In what position of the source of a sound can we not estimate its direction?

85. Which seems the longer:—busily employed time, or idle; and why?

86. Why does time appear to fly, in youth?

87. Give an example of training perception in your own occupation.

88. In reading.

89. Which do we over-estimate:—obtuse angles or acute?

90. Why is the top part of a capital letter B made smaller than the bottom?

91. What other printed characters are also purposely made smaller on the top?

92. Sketch a figure forming an optical illusion:—preferably on the same principle as one given in the lesson, but differing therefrom.

93. What is a hallucination?

94. Was Joan of Arc subject to an illusion, or to a hallucination?

95. What is the difference in shape between a cat's pupil and a goat's; and why?

96. Give an example of time and motion studies as applied to time-saving in type-writing.

97. Where can we get competent counsel?

98. Should children be encouraged, or discouraged, in asking questions? and why?

99. Name three activities in which analysis is essential.

100. What is the relation between synthesis and poetry-writing, or inventing?

LESSON VI

RECORDS AND STANDARDS

The preceding lesson went into great detail concerning perception, as distinguished from mere seeing; then took up observation, giving many questions to test the reader's—or his friend's—power and degree of observation. It should show that there are many more persons than would at first appear, who "having eyes, see not"; and who in other things than mere observation of surroundings and passing objects, let opportunity go unperceived.

Lesson V then took up Research and Investigation, which does not necessarily imply solution of intricate problems, or delving into the secrets of past centuries, with a view to obtaining the key of the future, but applying analysis and synthesis with attention and concentration, according to well-laid plans and taking counsel the while, and making records of the results.

Records. We shall now take up a most important topic:—Records; a factor which depends for its value upon the proper application of those mentioned before it. Unfortunately, personal records, save in the case of schoolgirl diaries and the memoirs of occasional personalities, are too scarce, unsystematic and incomplete, as will be shown when we consider their essential qualities.

Records are tangible, visible, registers; written, printed, traced, or otherwise made more or less permanent, to convey some fact or idea to others than the one making them, or to recall it exactly to him. They insure against mistakes of memory, oral repetition and propagation. They disseminate information, or perpetuate it, or both; they cross time and space. They must not be confused, as is done by some teachers ignorant either of the English language or of the making and use of records, either with signals, or with memories.

Neither an ordinary clock nor an alarm clock is a record; merely a signal. For although it disseminates information, yet with each vibration of spring or pendulum its information vanishes. However, should it stop as the result of an explosion or an earthquake, and thus indicate when that catastrophe occurred, it would become a record, as it would both disseminate and perpetuate information, but only so long as its evidence was corroborated and supplemented by the memory of those conversant with the cause of its stoppage.

A record is not, by a long shot, as Harrington Emerson says, "anything that gives information of any kind." For instance, a weathercock, a bad smell, a principle, all give information; for all that, are not records. Neither are there records in one's brain; as he states in his "Instructors' Manual."

Essentials of a record. Every record should have four essential characteristics. It must be

1. Reliable,
2. Immediately available,
3. Permanent,
4. Sufficient.

Reliability of records. No record is reliable unless made by some one who is unprejudiced, and has facilities for

1. Observing,
2. Judging,
3. Recording.

Immediate availability of records. In a business establishment it is often necessary to consult an old record within a very few minutes—not merely between mails, but while some one is waiting at the 'phone for an answer, or at the paying teller's window to cash a check. The daily newspaper must have its lives of distinguished persons written regularly up to date, to use at once in case the subject dies, or comes suddenly into the limelight.

Permanence of records. Suppose one's ledger accounts and other business records were in ink which faded out after a month or a year; in what condition would manufacturers and merchants find themselves? Similarly, where would our courts be, if the records of former judicial decisions, of transfers of property, of marriages, births and deaths, were to fade away shortly after being made?

Sufficiency of records. Suppose our ledger accounts simply stated who owed and who were owed, without stating the amounts; or contained entries of money sums, without giving dates of transactions, or stating the character of the latter! But it is just as important that records made in the interests of efficiency be adequate, as that bills and ledger accounts be full in detail. Put it down, then, that records, to be valuable, must be full.

The value of records is appreciated by the stock broker and the merchant or the manufacturer, who have before them tables and graphical charts showing the rise and fall of values, and the increase and decrease of production and shipments, during long intervals of time. From these, in connection with the reasons for such rises and falls, they deduce the probable conditions in the next period of time, and base their actions in accordance with their deductions. The farmer who understands his business (as distinguished from the mere "hayseed") watches the weather records, and determines therefrom his times of planting and reaping. Now why not keep time records as well?

One of the most efficient of generals and rulers, Napoleon, was the greatest gatherer of statistics of his day. Every foreign legation reported to him in detail. He knew the force and worth of alien armies as well as he did his own. His generals turned in daily reports. His secretary, d'Albe, installed his study at every halt, and the map-and-colored-pin system was used by him to indicate the position of every Napoleonic and every enemy corps.

"When there are many hands," says the Preacher, "deliver all things in number and weight; and put in writing that thou givest out or receivest in."

Records of time spent are much more important than those of petty cash outlays. But thousands of people who carefully record every car fare take no account of what they do with their 1,440 minutes per day, fixed individual time income.

Records of mistakes. If we take care—and pride—in recording every successful money deal, score at golf, or highly appreciated speech, why should we not be just as careful to record our mistakes, to aid us in avoiding such mistakes in future? Success is, in fact, merely the avoidance of mistakes. The automobilist finds danger signs just as important as those which direct him properly; why not then apply the same principle in everyday life, and record mistakes?

Records on printed blank forms are more valuable than others, for one reason among others, that in filling out the forms there is no danger of our omitting any one item. They are also more readily comparable, one with another, than if made without regard to sequence or to similarity of units.

Reference books are among the most valuable of possessions—yet how many are entirely without them, hence can not comprehend or verify newspaper reports, or make sure of being right before making assertions or taking action? Much may hang on the meaning of a word. For instance—do you know how many "several" is? Do you know the difference between "children" and "issue of her body"? Books of reference would tell this. It happens that important lawsuits have been decided by referring to books treating of these words in connection with inheritance.

"Graphs" are diagrams showing approximately and at a glance, in lines or their equivalent, what arithmetical figures give in detail, more slowly and less generally comprehensibly. When "graphs" add color to mere line, they are even more rapidly comprehensible. Their use as auxiliary records cannot be too highly recommended.

"Putting that and that together." After records have been made or obtained, proper use must be made thereof. We must learn to make correct deductions and additions. Some people put two and two together so loosely that they appear to make five—and learn too late that the connecting unit is only air. Indeed, there are persons whose mental mathematics are such that they put two and two together so as to make 22. This is the usual method of scandalmongers: but promoters and others accomplish the feat. What we must learn is to make the sum equal to four, nor merely 3½ or less.

Limit to the use of records. Common sense would indicate that in general it would not pay to spend a dollar in making records, in order to avoid making a fifty-cent mistake. Yet there are cases where even this is not merely excusable, but recommendable—as in bank book-keeping, to enable a balance to be struck correctly at any desired moment. The entry of a five-cent item may cost ten cents; but a balance which shows an error of five cents is open to the suspicion that it may contain, for instance, two great errors which balance each other within five cents.

Personal efficiency cards. It is not enough to record the personal details of an applicant for employment; to "get his references" and the like. There should be kept an accurate chart of his doings and efficiency, for use in increasing the latter constantly, directing his progress or hindering him from lagging or falling behind, and foreseeing his work and position for years ahead, if necessary. Further, such human material is a valuable business asset, and an equally valuable mental storehouse.

Standards. So much for records. Their determination and comparison enable us to fix certain limits of possible and desirable achievement; goals to reach; pinnacles on which to rest—at least for a time—and from which to survey the field ahead, with a view to attempting further progress, if such is humanly possible, when the time comes.

Standards are necessary to attaining and maintaining efficiency. Just as with stocks and bonds there is a certain value which is called "par," so with all achievement there is a certain amount or rate which is the highest, or the average, as the case may be, to which attainment is directed, and by which it is measured.

What is a Standard? Avoiding the usual dictionary definitions, I would call a standard "something that we stand up as a model to be imitated or excelled; something for which we stand up and strive."

Our knowledge of standards should be not only of their values, but of the methods of attaining them. The high jumper must not only know how high up the cord is strung across, but what among the various methods of vaulting will enable him best to clear it. Every jumper has to consider his personal makeup, the character of the offtake, etc., in order to make the best jump.

Arbitrary standards are such as are fixed by custom or law, only for measurement or comparison. As examples:—the legal foot, ton, pound; the five-half-peck peach basket.

Experimental standards are fixed as the result of some test or tests:—as a horse power; the German "*mor-*

gen" (the area of field that a man can mow and reap in a forenoon).

Ethical standards vary with place and time:—among them the Golden Rule, the standards of duty, right, conscience, etc.,

Standards of measurement refer to actual quantity:—gallon, ton, mile, etc., and are fixed.

Standards of type—for instance the percentage of fat in milk—vary with place and time.

Standards of test are methods—for instance, the way to test the heat of a flat iron or the temperature of a bath, the freshness of an egg, or the age of a fowl.

The object of standardization is to cut out and avoid wastes. The standard informs us what is necessary or desirable, and what unnecessary or wasteful. Without a standard on which to agree, and towards which to strive, no such elimination and avoidance would be possible.

Standards may be relative and arbitrary. In any one branch, the standards in a school are below those for a college, but above those for a kindergarten. There is no reason why any one of them should be placed where it is, rather than higher or lower; or that it should stay where it is, irrespective of any other.

" The limit of production " can hardly be said to be a fixed standard—as witness the achievement in all sorts of manufacturing, as well as those in aviation, navigation, horse-racing, base-ball pitching, and other activities.

The limit of achievement. The reason why the limit to achievement is constantly being raised, is partly psychological, partly purely physical. The man who has never jumped over five feet six inches high, no matter how often he has tried, raises his limit when he sees his rival clear five feet seven; and so on, as he encounters more and more able opponents, until he finds himself clearing six feet. It is not increased muscular strength alone; it is the fact that his nerves supply to the thews and sinews a certain increased impetus which makes them more efficient:—that is, they accomplish the same result with less effort, or a greater result with the same effort. And that is the test of efficiency; that, and that alone.

Take my favorite sport of rowing. Speeds are being increased yearly, not merely by improvement in boat lines and fixtures, and in shape and dimensions of oars, but by better understanding and application of the various muscles of back, arms and legs. The Belgians, with a water-logged boat and in strange waters, beat the English "Leanders" (not a regular crew, but one picked out from several "eights") and the entire trick was the use of shorter oars, wider blades and a different stroke. We all know the value of pace-setters in all kinds of racing—they hypnotize the runners, and increase their possibilities as well as encourage them. And we can just as easily hypnotize ourselves as let ourselves be hypnotized by others into the belief that we can do a certain thing. The Good Book says that if we have faith we can move mountains—and this is merely another phase of the same question. There is an intimate connection between our two words "can" and "ken." We "can" if we "ken" or know that we can do it.

Necessity for standards. There being no such thing attainable as perfection, excellence is merely relative. Being so, there must be something by which it may be measured; alongside of which we may stand and compare it;—in other words, a "standard." The standard which I am striving to reach may have been passed by you and others long ago—nevertheless I must have a standard, and it must be kept ahead of me just as yours must be kept ahead of you.

The basis of every standard should, where possible, be something actual. We may decide on a standard by

1. Noting the best attainments in the line in question,
2. Analyzing these as thoroughly as possible,
3. Measuring them by the best possible means,
4. Recording the measurements accurately,
5. Cutting out wastes,
6. Combining what remains into a standard, to be accepted and used until replaced by a higher one.

Setting the standard ahead. There is hardly any achievement in which, after a standard has been fixed and attained, there may not be improvement in performance—whether jumping, letter-writing on the machine, making entries in a ledger, or what not. This fact is often brought out by competition, where ambition and enterprise had not succeeded in making any change.

Growth through our entire life. Our mental, moral and physical being grow constantly, not merely in early life but almost through our entire earthly existence. Just when the maximum is attained, no one can say. Osler put it at 40 years—and keeps on lecturing and investigating, 40 years after he had passed that limit. Joffre and Hindenburg, who had been "laid on the shelf" seem to belie Osler's dictum.

Standardized conditions are necessary for comparison of performance or attainment. Thus, in horse racing the weight of the jockey, the track conditions, etc., should be the same. The mule's efficiency is largely due to his having standardized conditions. He knows just what he can do.

Standardized operations are necessary for comparison. In one sense they are conditions—but we must treat them separately. In a factory we can compare the work of the employees and the output of the machines only where the operations of the persons or the machines compared are the same.

Written standard practice instructions are desirable, if necessary to the attainment of efficiency of performance. They are less likely to be misunderstood or disobeyed than oral ones; and just because standards may be raised, instructions should be written to prevent the old ones being mixed with the new.

Standardizing oneself is necessary. Just as a shovel is the tool of one's muscles, so the muscles are the tools of one's brain, and the brain is the tool of one's will (whatever that is, which I do not pretend to say). But whatever the will is, it, as well as its tool the brain, and the latter's tools, the muscles, should be standardized. Standardizing the will is one of the many means of attaining personal efficiency.

To standardize oneself is often not merely a problem but a puzzle; but there is always a solution. It is found largely in the records of what others have done, and in the standards which others have set and attained.

But this one principle must be ingrained: standards are, and should be seldom fixed; the achievement should be greater each year for any one person, and greater for each succeeding person on the world's field of activity, than for his predecessors.

Self-estimates are apt to be faulty. They differ from those made of us by our fellows. Both are probably wrong; but the latter are apt to be the more correct, possibly because there is only one person estimating himself while he may get the estimate of thousands of others concerning himself if he only goes the right way to get them—indeed, often without going to that trouble.

Accurate knowledge a prerequisite. Self-confidence is all very well; but we must base it upon accurate knowledge of what is to be done—*i. e.*, of the standard. If we see a stone and do not know whether it weighs 400 or 4,000 pounds, our confidence in our ability to lift it will avail but little. (Whoever does not believe it will please try to wave the "rocking stone" in the New York Zoölogical Garden.)

The bull that tried to butt the express train off the track had self-confidence all right enough; but what he lacked was accurate knowledge of the task.

Main and sub-standards. In making time and motion studies we must have main standards referring to the process or operation as a whole, and sub-standards for each component part or stage. Thus if we have as a main standard the time required to go from house to office, the sub-standards should be the various parts of the journey—(a) from house to subway or train, (b) for the transit, and (c) from station to office. Investigation will usually show that each stage may be shortened without noticeable effort—that there have been trifling time wastes due to unnecessary pauses and not having cut across corners, or chosen the route with the best going.

Records of standards are necessary, in order that we may be sure what the latter are. When we can refer to the standards of our own achievements and those of others, we have a spur or whip, otherwise lacking.

Collation of recorded standards is advisable, because

1. It gives more material on which to base averages,
2. This increases the saving which standards effect;
3. Each observer increases his practise in standardizing;
4. This again causes increased saving;
5. These savings permit making more standards, and so on in an endless chain of improvement. It is like constantly sowing and mowing clover, then plowing in the stalks and roots left after mowing.

Standards do not destroy individuality, as is often asserted. On the contrary, they incite individuals to exert themselves to surpass others' standards by individual methods.

Standards in penmanship are essential to progress.

As regards outline, I suggest the artificial word "hyminuhy." If written absolutely symmetrically, it will look exactly alike, whether right side up or inverted. A standard of speed may consist in writing 15 words per minute legibly with a good pen, on smooth paper, during 20 minutes. (Text should be chosen, containing words unfamiliar to the subject of the test.)

Standard speed in penmanship practice. Experts have calculated that one should be able to make per minute equal 200 continuous ovals, 64 to 67 capital O's, 38 to 40 capital M's; to write "pennies" or "gaining" 15 times or "applied" 19 times.

Type-writing standards. The standard of achievement on the type-writing machine may be said to be what has been attained several times by different persons under stated conditions. It is higher for work on the touch system than by sight writing; for instance: while good sight writers can copy 40 to 50 words per minute, touch operators can do 60 under the same conditions. The highest record which I first noted was that of Miss Mae Carrington, who could write easily from any kind of straight copy at the rate of 70 words per minute; but she was beaten by Miss Rose Fritz, who made in an hour's test a record of 3,857 words correctly written; 64.3 words a minute for that long time. One operator wrote the practise sentence: "A quick brown fox jumps over the lazy dog" (which contains all the letters of the alphabet) ten minutes each day for 40 days, to keep his hand in. Another wrote the practise sentence "pack my box with five dozen liquor jugs" 120 times a day, until he could write 120 words a minute.

Standards for office work. W. L. Chandler gives the following as fair standards per hour:

Opening and sorting letters..................	200
Opening, reading and sorting letters...........	60
Registering 5-item orders....................	200

Typing ¾ page letters from stenographic notes.	15
Folding and creasing letters..................	500
Stamping letters, using sponge................	3,000
Stamping letters, with hand machine..........	3,600
Stamping and sealing letters with power machine	10,000
Adding items on plain machine...............	2,800
Adding items on power-driven listing machine...	3,500
Adding items on non-listing machine..........	8,400

Standard of United States army. The minimum standard proportions set by the United States army for men is at six feet to weigh 169 pounds, with a chest of 36¼ inches, and the waist considerably less. That standard is based upon repeated efficiency tests. The great majority of business men at or beyond twenty-five years would look pretty bad if measured by that standard. Of course most men do not want to be soldiers; but they do want to be physically efficient.

Machinists' standards. Sometimes a standard is a test piece—for instance, I would give a machinist who offered himself as a vise hand a block about the size of a very thin brick, and tell him to file it exactly rectangular. If he knew his business, he would first see that the vise was at such a height as to bring the top of the work-piece in the horizontal plane of his elbow; and when he had done the piece, if its edges were sharp and the sides true planes, not bellying, he would have proved that he understood his business. For a more exacting test I would require him to chip and file a perfect cube out of an approximately cubical block, without greatly reducing its size. If he could do this, I would consider him a No. 1 vise hand, and trust him with work requiring skill and accuracy in execution.

The sailor's standard. The sailor—including the officer of the merchant marine or the navy—must above all in an emergency know just what to do, and do it at once. The unexpected wave, the sudden squall, may smash everything in one short minute, unless the proper command be given and carried out. There is no time for either deliberation or counsel. The problem being put, the answer must be automatic in conception and expression.

QUESTIONS 101 TO 120

101. Is an alarm clock a record?

102. An obelisk, with inscription?

103. A ledger?

104. What are the essentials in a record?

105. What is the most important record in the world?

106. The oldest?

107. Why should aniline ink not be used for records?

108. Lead pencil?

109. Why is a clay-laden paper better for account books than one of pure linen?

110. What is the most valuable reference book?

111. Make a "graph" showing to scale the prices of some stock for the past week.

112. What is the use of recording every penny spent for car-fare, newspapers, etc.?

113. What percentage of your time, if any, is spent in doing things that are not worth doing?

114. What is the standard unit for measuring power?

115. The U. S. legal standard unit of weight for coal?

116. Electrical current?

117. What is the object of standardization in manufacturing?

118. Name an arbitrary standard that has been set ahead from time to time.

119. What is the speed standard for typewriting in your office?

120. What is the advantage of collating standards?

LESSON VII

PLANNING

Having discussed Records and Standards in the sixth lesson, and I hope, applied that lesson to our personal aspirations and needs, we are now ready to take up the ninth factor: Planning.

A plan is a methodical arrangement of steps or means to attain some object; a formulated scheme for reaching some result. It may or may not be put on paper. Properly, it lays down what is to be done; how, in what order, and by whom and what.

The chess player carries his plan in his head, which is commendable. American detectives announce in advance their plans for catching criminals; which is ridiculous.

An example of planlessness was Ford's peace mission. Wanamaker criticised it in advance as being planless; saying that Ford could not get a door to open in Downing Street, at Potsdam, or in the Wilhelmstrasse. Wanamaker was right.

"Festina lente," meaning "hasten slowly," is a good motto in regard to plans. They should lie over night for deliberation, and be made only after taking due counsel. "Two heads are better than one."

Planning for helpers. In too few manufacturing establishments are there plans by which the full time of every worker and every appliance is arranged for, long ahead. Hence, inefficiency both of workers and of plant. "Chink-in" work should be provided, so that every minute may be utilized to the full when "stock" work is slack.

Planning to unload details. The efficient manager arranges so that all detail work, which others can do as well as he, shall be taken from his shoulders. This gives time for planning and carrying out important matters.

Counter planning. In many instances we are not the only ones concerned in plans, and must consider whether or not there is opposition; if so, in what form it will likely manifest itself. The chess player considers what moves his opponent would be likely to make. Moltke had three plans for invading France in 1870.

Planning demands imagination and judgment. Imagination is called for to suggest what the opposing forces, either active or passive, may bring up; judgment to decide how best to counteract opposition;—the probable cost of each method of attack or defense, etc.

Americans are deficient in planning. We are unfortunately too slouchy and slipshod in our methods—hence our inefficiency. Those who think that we are efficient should compare the work of other nations in city planning, in agriculture, commerce, snow cleaning, militia raising, forest conservation and dozens of other lines of activities. We "take too little thought for the morrow."

How many have planned what to do in case of fire, shipwreck, flood, or any number of other emergencies just as likely to come up here as in other countries?

Rush days. How many are prepared to handle the pressure of work in "rush" days or seasons? (In slack ones, either, for that matter?) How many have a bank account sufficient to carry their families a month, even —much less through a long season of sickness or enforced idleness? on the part of the earner of the household?

Planning wisely anticipates future demands of either normal or extraordinary nature.

Emergencies. A great deal of inefficiency in result is due to inefficiency in planning with respect to emergencies. "It's the unexpected which always happens" is an old saying—which Prof. Sweet has improved into "It is the impossible which always occurs." "For want of a nail the shoe was lost, for want of a shoe the horse was lost," and so on through the chain of mishaps resulting from lack of foresight. How many of us are prepared for the various emergencies of sickness, accident, death, fire, failure in business, etc? How many know, for instance, what papers and valuables to rescue in case of fire, and where to put them in safety, after all human beings are accounted for as out of danger? How many, on renting a new apartment in a modern caravansary, see where the exits are, in case of fire? How many bother themselves about seeing that they are kept in order and free of access? How many passengers on a ship know where to find the life-preservers, on deck and below, and how to put them on?

The approval of a naturally interested father to his daughter's marriage to a naval officer was gained by the report from the captain of the vessel, that the young man in question always knew at once what to do in an emergency, and did it right away. Plenty of people are efficient under ordinary circumstances—perhaps wonderfully so—but fall down completely in an emergency. The ability of von Kluck and of the Russian Grand Duke to conduct a successful retreat exceeds by far the performance in advancing; a fact recognized by military authorities as well as the general public "on both sides of the fence."

Should you burn out to-night. Assume that a fire breaks out to-night in your factory, store, office, home or stables. Are you fully insured, in a good company? Have you personally attended to the payment of the premium, long enough ahead, so that in case of your death it might not lapse in the confusion? Have you seen to it that none of the provisions of the policy have been violated by you or by others—for instance by some one starting a dangerous business next to you? Have you a recent detailed inventory of all the articles insured, provable as to its correctness? Is the policy kept safely elsewhere than on the insured premises? Do the members of your firm or family know where it is? Have you taken precautions against fire occurring in your own premises, and warned your immediate neighbors in case you see likelihood of a fire in theirs? Have you proper fire-fighting appliances? Do you and yours know where they are, and how to use them? Do you, personally, know by frequent inspection that they are in good condition? Do you and yours know just what to rescue in case of fire, and where to bring it? Do you and yours know how and where to turn in an alarm in case of fire on your or neighboring premises?

Then sleep well and care-free.

Arkansas homesteaders. A traveler in Arkansas, passing by a tumble-down homestead before which the leisurely owner was playing the fiddle, oblivious of the passing of time, asked him why he did not repair his roof. "Tisn't a-rainin'" replied the resident, without letting his bow rest; "and when it's a-rainin' I jess nachelly cain't do it."

There are many Arkansas homesteaders in this world.

Rush days. There comes a time in every one's affairs when there is a rush—unexpected, yet not always undesired. There should be plans for handling this extra work without either delay therein, or expensive shunting out of other work already in hand or intended to be put in hand. The establishment that is not prepared by planning for such rush days is not efficient. There should always be plans for obtaining extra material, labor, capital or transportation. These plans should be so formulated that in case of absence of the head of the establishment or of the planning department (if there should be such department) the extra steps may be taken at once and with certainty.

When to plan. It should hardly be necessary to say that planning should be done in advance. Yet many seem to spend a considerable part of their time in figuring out how much more quickly they could have done things, or how much more cheaply they could have bought things, had they done otherwise—without, however, making any practical application of their researches and discoveries, as regards the future. Now while the past is, or can be, made a valuable asset, "the mill can never grind with the water that is past." The future should concern us much more. We should put in less time crying over spilt milk, and more in arranging for a fresh supply and preventing future accidents.

Wise anticipation of future demands. This, while akin to planning, differs therefrom in that one may plan to carry out the demands only of the immediate present (which in fact, for planning purposes, does not exist; for as sure as a plan is made, that "present" has fleeted). The difference, expressed in terms of education, merchandizing, agriculture, transportation, or manufacture, is simply that one may plan to carry on a college or a store, a railway or a factory, on its present lines, without interruption or loss; but "a wise anticipation of future demands" will lead the college president to foresee the possibilities of a university grouping about the present institution; the retail merchant, to prepare for enlarging his building and conducting a wholesale business; the railway president, to prepare for double-track prolongations, straightenings, and branch lines; the manufacturer of bicyles to extend his activities to embrace first motorcycles, then automobiles and aeroplanes.

Schedules. So much for planning. I hope that this part of Lesson VII has led my readers to think up many activities in their present daily lives, and some in the near future, which are susceptible of advantageous planning; and have formulated or at least commenced, plans for carrying them out.

But there is something more to do. No complete plan can be put through to its conclusion, unless means are provided to facilitate its execution regularly and without interfering with other things. To do that we must prepare Schedules.

These are registered memoranda of the order in which our plans, as based on records are to be carried out. What is recorded is apt to be deliberate and unmistakable. Many plans, because only written in air, are never carried out, or but imperfectly put into execution. Scheduled plans are more apt to be carried out, and surely are less likely to be varied. Schedules place the responsibility for disobedience of plans and orders.

What a schedule implies. The average schedule implies more than one element concerning which plans have been made. It calls, for instance, for moving more than one train, on more than one line, and more than once. It prevents too early or too late starting and arrival, and collisions; further, sends out the fast trains before the slow ones, thus utilizing the tracks to best advantage.

Order. When Alexander Pope wrote "Order is Heaven's first law," he announced a theory that no one has controverted. What keeps all the planets rolling in their orbits without collision and without delay, except what exactly might be expected, is the order of their arrangement. In our little solar system (which, as compared with the universe, is like a handful of sand in the desert of Sahara), we find a mathematical proportion among the distances of Mercury, Venus, the Earth, and the rest of the series—each distance being in a certain relation to those of the planets nearer to and further from our little sun. Everything is balanced and runs smoothly, because of order; any perturbations which take place are just what astronomers predict long before they occur. It is partly because of this proportion among the distances that the existence of the two outermost planets was predicted, and their exact positions calculated, before they were seen; so that one astronomer, who had no good telescope, wrote to his colleague who had, that on a certain day and at a certain hour and minute he would find a new planet at a definite place in the heavens. The colleague found it.

That "disorder" often spells "disaster" is narrated in Hoenig's History of the Franco-German war. A body of German infantry, a park of artillery and a squadron of cavalry endeavored to pass through a narrow road in two different directions—with loss to all concerned.

Blundering along. The man who makes any kind of experiment on other than a scientific pre-arranged plan and schedule, is a gambler. He takes his chances on drawing the grand prize. He is shooting at random, in hopes of hitting something, he knows not what, or of hitting some one desired thing.

The first thing is to block out what has been done in the way of experiment or research in the line in question; so as not to repeat it; next, to note which of the work methods already tried has yielded the most encouraging results; then to commence with work in the same general direction, and so on, narrowing the lines until they are seen to include the point desired to reach. The gold seeker makes borings at stated distances in different directions in straight lines, and samples the material taken up. If he finds half a per cent in one boring, a quarter per cent in one to the east and three quarters in one to the west, he runs his line westward as long as the percentages increase; and when a decrease commences, concludes that he has struck the maximum along that line. Through this maximum point he strikes a line of bore-holes north and south; and working on the same principle, at last finds the most favorable point for sinking a shaft.

Time-tables. How long do you suppose even an ordinary single-track two-locomotive railway could be run without a time-table? Even the modern machine-shop has one for each job. The materials are ordered at such times, and with such stated delivery periods, that they will arrive just when needed; not sooner, so as to clutter up the shop, not later, so as to ball up the work. Each piece has a time set for starting work thereon, and one for delivery for further working. Where there are several components, their starts and finishes are so arranged that they will meet at an appointed time and place for assembly. By this means, every man who is in the works ten hours has 600 minutes' work assigned him; and rush jobs can be rushed and "no-hurry" jobs held up, in the interest of full utilization of time. These time-tables are just as valuable money savers as are the improved machines and appliances and the motion studies for getting more work done in a given time with less sweat and backache.

Personal schedules. If it is necessary for a railway to have time-tables and schedules, and if even manufacturing establishments which operate on modern efficiency principles have pre-arranged schedules by which every worker and each machine has tasks assigned for each minute of the day, and the times of arrival of raw materials and meeting of finished parts ready for assembly are preordained—why should not each human being have his own personal schedule, assigning the best time for commencing and finishing each duty, and the best order in which tasks should follow each other? If the schedules in a machine-shop are as valuable in promoting efficiency as the improved machines and processes and the specialized workmen, why should not the self-arranged personal schedule be equally important to the individual?

Can every one work by schedule? I often hear the remark: "I can not work by schedule; my temperament is different;" (or "my work is of a special character"). If any one has a temperament which is a special hindrance to working schedule-wise, or an occupation which he thinks renders scheduling impossible or even difficult, he is usually the very one who needs schedules more than any other. For most persons who are methodical by nature will insensibly work by more or less detailed and efficient schedules. People who "can not adhere to a schedule" should remember that railways can not always do so, either; but when they fall behind they recognize that the schedule is necessary, by getting back to it at the earliest moment.

Household schedules. In these days of commuting there is more need of a schedule in every household than where a delay of five minutes or ten may not cost the head of the house his position if too oft repeated, or cause a heavy business loss. A household schedule would prevent many a hard feeling and more or less deserved reproach of indifference or inefficiency.

Five main points in a schedule are:

1. Standards to which to work,
2. System in working thereto,
3. Originality in planning, so as to best provide for all contingencies,
4. Interest in carrying it out,
5. Concentration of mind to avoid errors.

"Carpe diem." The old Latin motto "carpe diem" or "seize the day" was the forerunner of our "take Time by the forelock." If inscribed in many a home and office, it would save many a regret and loss. Following schedules will best enable utilizing each day to full advantage. Adherence to this motto also encourages promptness in dealing with emergencies.

An hour a day, devoted to the study of a foreign language, by learning say thirty new words, will give in three months a vocabulary of nearly three thousand terms—one fourth as many as even Milton or Goethe used, and many more than the average person needs either socially or in business.

Diagrammatic schedules are often better understood than those expressed in mere letters and words. A strip representing by its length a given period of time, and divided into sections showing what proportions of this is to be devoted to each task, and in what order each is to be performed, will appeal to many, more imperatively than one made in the ordinary railway method. If the sections are varicolored, so much the better.

Despatching goes with scheduling, because schedules are no more use without proper despatching than weapons without some one to wield them. The despatcher endeavors to keep the work rigidly to the time-table; if he fails from his own fault or from press of circumstances, he blesses his stars that there is a schedule which will help him to untangle things.

Banked-up work is at once an indication and a cause of inefficiency. That is, inefficient scheduling and despatching causes banking up; this again causes further disarrangement of all plans. The man who works according to schedule—whether his own or another's—does not necessarily work faster or harder than any one else; but he will be less hampered physically and mentally, because of the schedule and of his proper despatching.

The advantages of despatching have been tabulated as follows:—

1. Safety,
2. Time saving,
3. Elimination of worry,

4. Economy of energy,
5. Money saving,
6. Satisfaction.

The essentials in despatching are:

1. A good plan,
2. A good schedule based on that plan,
3. Accuracy,
4. Strict attention.

To these are often added:

5. Speed,
6. Coolness,
7. Carefulness.

Doing two things at once. There is an old motto about doing only one thing at a time. I would tie a metaphorical string to this; for an efficient plan, expressed in a proper schedule, and carried out by proper despatching, permits of doing more than one thing at a time, without neglecting either. One might as well say that a railway should run but one train at a time. The more efficient a railway management is, the more trains at a time it can run without interfering. Some can get more trains through a day, on one pair of rails, without risk—to say nothing of accident—than others with a double track line of the same length, and the same amount of traffic.

In these lessons I hope to point out how you may do just that very thing—do two things at once—without in any way neglecting either, and to full advantage.

Discipline. The eleventh factor in personal efficiency, enabling one to despatch the carefully planned schedules without getting either rattled or discouraged, is discipline. This word is often misinterpreted as meaning only punishment. But in fact, good discipline can be attained without any penalty. It is subjection to authority; training of our powers by instruction and exercise; being under control of one's self, of others, or of a system. It calls for subjection to one's own lines of life and thought, as planned after research or investigation, aided by counsel, and properly scheduled.

No one who can not discipline himself is fit to govern or control others. The slipshod employer will have slipshod workers and shop. The rebel against duly constituted authority will find others in rebellion against him. Witness Trotzky.

Penalties should be beneficial. Mere infliction of pain or deprivation of pleasure is harmful, when it does not produce a desirable and wished-for change in the one disciplined. The great educator Horace Mann said: "The object of punishment is prevention from evil. It never can be made impulsive to good."

So much for discipline, as meaning penalty. The discipline that is essential to personal efficiency is that which searches the soul and brings out from its depths the truth and the help needed.

Nature's penalties are punishments. The penalty of dirt is disease and death. The penalty of building one's house upon the sands is its destruction in time of storm. The penalty of ignorance of Nature's laws (like that of ignorance of human enactments) is loss of liberty or of life. Fortunately for us and ours, we know most of Nature's laws well enough to be able to obey them.

Self-imposed penalties are the result of self-imposed discipline. To sacrifice pleasure, time or expenditure to attain a desired object. We impose a penalty when we have been mastered by a weakness; subject ourselves to discipline when we fear to be so mastered. Our self-imposed penalties must cover both positive and negative infractions.

Incentive. The average man is no altruist. He is more apt to consider the motto: "The greatest good to the greatest number" in the sense that the greatest number is Number One. To a certain extent it is well that this is so. Too many heads of families neglect their own flesh and blood in their eagerness to effect reforms in others; too many mothers devote themselves to the heathens in Borrioboola Gha while their own children go unwashed and with unmended clothes. There should be personal incentive in all exertion. It may be money or its equivalent, or praise; love of freedom, or good will; knowledge, or political power; social prominence, or the satisfaction of doing one's duty, or of doing good outside of one's duty. But in all cases there must be an incentive in order to get the best out of oneself or out of others. Forced labor, whether mental or physical, is seldom efficient. The average human being, the average community or State, needs and expects an incentive to exertion;—(often even to non-exertion, as witness Rumania in this war and the one which preceded it). So we put down Incentive as the twelfth factor in efficiency of all kinds, including the personal kind.

The money return. I am not inclined to take stock in the doctrine "Cast your bread upon the waters, and after many days it will return to you." In the first place, too much bread is "cast upon the waters" by givers without judgment, and by inefficient missionaries. In the second, as a matter of fact the bread does not always return; nor is it right that we should expect it to. That would be "Indian giving." The true altruist should expect but one reward or return—and that at once—the satisfaction of being of use; and where possible, efficiently.

The "quid pro quo." There is a story of a countryman who put up at a tavern on the outskirts of a great city, having brought with him a load of hay to sell in the morning. In the evening he met up with a sharper, who proposed a game of cards. The countryman said that he had no money. "No matter," said the bunco man: "I'll play you for your load of hay." Needless to say, the sharper won. Next morning, however, a light suddenly dawned upon the countryman. Going to the tavern keeper, he expressed himself thus:—"Say—lookey here! What did that feller put up agin my load of hay?"

Now every one of you would put the countryman down as so green that the geese would nibble at him, in the thought that he was grass. But how much wiser is the employer who pays a workman three dollars and a half for eight hours' work, without knowing how much the man can do in that time? Yet there are hundreds and thousands of such man. You, for instance! "How long does it take the first man in your employ whom you see,[1] to cut off a pipe, rasp the ends off even, bevel them with a rasp, expand one end with the turn-pin, scrape the pipe-ends bright with the shave-hook, soil both ends and wipe the joint? Yet if one man takes fifteen minutes and the next one twenty-five, you should know it, for two reasons; one to enable you to estimate the cost of a job, the other to let you know which man to lay off when work is slack."

The living wage. The great problem with the living wage idea would be to find work for the incompetent. Every employer would wish them on to some other. What would we do with such incompetents as the Norwegian girl who applied for work in New York, and on being asked what she could do, answered: "Ay can melk reindeer?"

Effect of hope of reward. When August the Strong, Elector of Saxony, shut up the chemist Boettger in the castle of Meissen, with the threat that he would not be released until he discovered the philosopher's stone, which would turn lead into gold, the punishment was some incentive to Boettger, in that it carried with it the hope of reward in the shape of freedom, fame and riches, should he succeed. He did not find the stone, but he did re-invent porcelain (which previously came only from China) and thus confer a boon upon Western peoples in general and his own little Fatherland in particular. If, however, he had been left in freedom and threatened with imprisonment or even death, in case he did not discover the philosopher's stone, he would probably have invented or discovered little or nothing.

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[1] This was before a convention of master plumbers.

The very fact that in family and State penalties are often inflicted repeatedly upon the same individual, shows that they should not be punitive, but deterrent. If punition were deterrent, it would never be inflicted twice, or at least many times, on the same person for the same offence; and would even serve to keep other persons from breaking the law;—or at least such laws as are mere enactments and do not conflict with duty and conscience.

QUESTIONS 121 TO 140

121. Define a plan.

122. Can one have two plans at once?

123. Should the details of a plan be laid out far in advance, or worked out from time to time?

124. Why does planning call for imagination?

125. Why does it call for judgment?

126. Do you know just how to escape from your building if there was a fire, therein, what to take with you, and where to go?

127. For what should a railway management plan?

128. How far is a railway conductor justified in departing from the schedule?

129. What is the advantage, from the financial standpoint, of a schedule in a machine shop?

130. From the technical standpoint?

131. Is your present or intended occupation one which permits of exact scheduling?

132. What are the five main points in a schedule?

133. The six advantages of good scheduling, properly followed out?

134. The essentials in despatching?

135. State two things which can be done or attended to at once, in your own occupation.

136. Give a good definition of discipline, in its broader sense.

137. Should imprisonment be a punishment, a preventive, or a corrective?

138. What are the penalties of dirt?

139. What is the objection to the so-called minimum wage from the standpoint of the individual worker?

140. What is the disadvantage to America at large, of Henry Ford's payment of a minimum wage of $5.00 a day?

LESSON VIII

ENVIRONMENT AND HABIT

Having applied the study of **planning, scheduling and despatching** to our personal cases, and learned that the man who makes no plans ahead, arranges no time tables for taking up each step of the plan in regular order at a predetermined time, and for sticking to the schedule by conscientious despatching, is and must ever remain an inefficient man, and be distanced in the race by those whose lives are well ordered and activities well carried out,—we are now ready to consider the various influences which act upon us and either aid or hinder us, as the case may be, in carrying out our plans according to schedule.

Among these are **Environment** and **Habit.**

Environment. Many persons are inefficient because their environment has either prevented their mental, moral or physical development, or neutralized it after it had been wholly or partially attained. I asked the late celebrated Professor Hermann Dunger of Dresden, why the Saxons were so small. He replied: "We have not had enough to eat for three hundred years." The deterioration in size of New Yorkers (especially the women) since 1895 or so is largely due to the flood of immigration from poorly nourished East and South Europeans.

Eight environmental influences. Among the various environmental influences bearing on physical efficiency are:—

Light
Temperature
Food
Air
Water
Clothing
Furniture
Quiet

Influence of light. It is strange that those who set much store upon giving plants plenty of light, as one of the prime factors in influencing their healthy growth, do not see that light—meaning principally sunlight—furthers human growth and well-being, and is an important factor in favoring mental action. Many a machine-shop proprietor has experienced the good effect of merely white-washing the ceiling, posts and rear inner walls of a dark building. Progressive gardeners are using electric light to stimulate flowers and fruit trees to more rapid and sturdy growth. The reasons for giving the human organism plenty of light from the right quarter, are just as potent.

Influence of temperature. Nowadays there is a good deal of efficiency study of other persons. One line of investigation is in connection with school-room temperature. Our general school room, with about 80 boys, was kept at 65° F. in winter, and we were perfectly warm and comfortable; and judging from the percentages at month end, and the standing at examination for entrance into college, we were efficient. In a girls' school under the same management, in the same building, the temperature and efficiency were the same. But in another girls' school, attended by the same social class, the pupils sat shawled and huddled, with the mercury at 80°.

Climate and efficiency. As climate is one of the reasons for racial differences, so it has also an effect on the mental and physical—perhaps also the moral—make-up of individuals of any one race. The Northern farmer who goes South first inveighs against the slouchy, indifferent ways in his new surroundings, then does not notice them; and after a few years his fences gap, his gates swing on one hinge, the same as his neighbors'. It is claimed by Los Angeles that a man can do more work there in a year, or in any one day, than in the same time in the East; that the atmospheric conditions are conducive to "pep."

Work and weather. The amount of work that almost any one can do, and does, is influenced by the weather more than one at first thinks. A very interesting paper on this subject is to be found in *Harper's Magazine* for January, 1915, p. 233, by Huntington of Yale, based on experiments made on 500 Connecticut factory operators and 1,600 Annapolis and West Point students. The wages average lowest towards the end of January, quite high in the middle of June, and highest in the first part of November; but the averages were not the same in all years. The high average in November is not due to rush of work.

It is not a question of light alone as a stimulant, for the work curve rises before the temperature does. It is not only because people are shut up in the house in January. It is very probably one of humidity due to overheating. It is not due to Summer vacation, because the November maximum comes too late and is too high and long. It would seem as though people had need of more vacation in Winter than in Summer. The temperature and work curves are very similar, showing a relation just the opposite of what we usually consider. High temperature, as such, is not unfavorable. Each type of activity has a distinct optimum at which it is greatest. This lies at lower and lower temperatures as the type of activity reaches the higher level.

Influence of food. I have already referred to the small size of the natives of the Kingdom of Saxony (not the Prussian province of the same name) as due to long-continued insufficient nourishment. I now call attention to the sturdy frames of the big Pomeranians and Brandenburgers, as examples of the results of under, or at least normal, population. The use of polished rice in tropical countries has been shown to cause the terrible "*beri-beri*" sickness. The "poor whites" of some of our Southern States show in their yellow complexion and great paunches the results of clay eating.

Influence of pure air. Pure air and ventilation are important factors in our own comfort and that of others. They may be considered from the view of esthetics or good taste, and health or hygiene. Good taste instructs us to be careful in bodily habits, especially in company. Such nicety will not permit us to offend against decency and good manners and will prevent us from physical negligences of an offensive description both in public and private. The odors of stale drink and tobacco and waste bodily emanations are offensive even to the person who is not over-fastidious, and we should seek to be in good odor with those around us physically as well as morally.

Our rooms should be well ventilated and the bodies of those inhabiting them sweet and clean. The living chamber of a negligent person will not suggest the perfumes of Araby or the odor of sanctity. Wholesome bodies and nice physical habits together with plenty of pure air mean good health and a good appearance.

To give an illustration near where I write—one has only to compare the splendid chubby, rosy-cheeked babies in the Washington Heights district of Manhattan with the east side children. Of course, good feeding accounts for some of their fine health and appearance; but in my mind the principal factor is the fresh air given them during their long promenades in the "proms" with which the main streets are made at times almost impassable for ordinary pedestrians.

Influence of water. The sturdy frame and beautiful strong white teeth of the Thuringians are due to the proportion of lime in the water there. The splendid, brilliant complexions which one sees at every hand in

Kaernten (Carinthia) comes from the minute quantity of arsenic in the water. This also gives increased lung power—very desirable for mountaineers. (Those "in the know" recognize the value of arsenic in giving a horse a sleek coat and good wind.)

Influence of clothing. We are greatly handicapped by clothing. The stiff shirt collar impedes the freedom of movement of the head and neck; what is more important, retards proper blood circulation to and from brain and eyes. Women's shoes throw the weight of the body forward, and induce spine trouble. Corsets are the curse of the world. (A celebrated gynecologist in Dresden refused absolutely to treat any girl or woman, unless she would give them up.) The "top" hat makes men bald; all men's hats heat the head unnecessarily. Hardly any garment of either sex does not lessen human efficiency. As for the poor little babes in arms, while they no longer wear four-foot-long skirts, they still are dressed uncomfortably and unsanitarily.

It puzzles me why any baby lives to be a year old; sometimes, again, when I contemplate what those tiny beings resist, why any one ever dies.

Influence of equipment. Here is another instance of the influence—sometimes the undue influence—of trifles. One should be able to write with almost any sort of a pen or pencil; but of course on rough paper the pen slides less rapidly, the pencil less easily. The balance of a hammer handle, the position of a sleeve button, the tightness of an undershirt sleeve, the height of a gas burner or an electric lamp—hundreds of little things—affect not only our comfort but our capacity and efficiency. We should look to them.

Influence of furniture. Anyone who pushes a file knows that to do good work the vise must be exactly elbow high. Any pianist is careful to screw the stool up or down to the height at which arms and hands are less hampered. The efficient typist knows that when her seat is high her shoulders get tired; that if she does not sit centrally she will probably strike wrong keys. A hard chair produces discomfort and lessens our efficiency; too warm and soft a cushion causes hemorrhoids.

These little things influence the quantity and quality of our work more than we are disposed to think.

Influence of quiet. It has been proved time and again that the mental efficiency even of those not supposed to "have any nerves" as the saying goes, is diminished by unnecessary noises. Fortunately, we are not dependent on our habits of intentional observation. We are so endowed with sentinels that we instinctively turn, duck, or watch, when we receive an unusual impression through our watch-dog, the ear. Now you can well imagine that if a house dog were constantly kept on the *qui vive* by rattling a latch here, crunching a gravel-walk there, trying a window, flashing a light, he would finally become inefficient through mere weariness, and fail you in time of real danger from burglars. The same with the ear. If put through a "third degree" by the rattle of milk wagons, the shouts of peddlars, the jingle of pianos, the efforts of singers to reach the high C, the whistling of railway trains, the roar of the subway, the unloading of iron girders, the shouts of workmen, the wrangling of curbstone politicians, the yelling of stock-brokers, it is spending nerve force, and losing not merely its own efficiency as an organ, but that of the entire mental and nervous system. Hence, if for no other reason, the need of a quiet Sunday; further, the desirability of suppressing all unnecessary noises during the working day.

Freedom from interruption as a factor of efficiency, is akin to quiet; for unusual noises break our chain of thought, if only for half a second. But still more lowering of our capacity and efficiency, are undesired interruptions in the work. There are times when a child's prattle, or any other interruption, is welcome or advantageous—but only where the system has been strained by too long spanning, and should be allowed time to recover elasticity. Any one who has to add up columns of figures other than with a machine knows how his work is hampered by ill-timed questions. One of my friends has over his desk a punning sign: "None so deaf as an adder."

This points to the advantages of system in general, as carried out by time study and schedules; and of early rising in particular. Both tend to freedom from unnecessary interruptions.

What is habit? Various definitions have been offered:

1. Acquired instinct,
2. Derived automatic willing,
3. Unconscious and involuntary actions forming an action (either outer or inner) into a propensity,
4. Second nature,
5. Tendency of actions to repeat themselves or become more easy,
6. Fixed tendency to think, feel or act in a particular way, under special circumstances.

Habit differs from instinct in being acquired and fixed in one's lifetime, not inherited.

As regards the body, habit means automatic readiness for some function. With the mind, it is loss of oversight, diffusion of attention, subsiding consciousness. The thousands of men and boys in New York who walk about the streets, sit in the subway cars and even in public places like hotels and stores, whistling without time or tune, show by their vacant faces that their attention is diffused; and by their whistling when and where even the greatest boor should know that it is out of place, that they have acquired a habit.

"Man is a bundle of habits"—(most of them bad, says Chesterton).

Accommodation is the converse of habit; breaking up old habits, and getting the system ready to receive or accommodate new conditions. One who has the habit of sleeping after dinner requires effort to enable him to do without the daily rest; the confirmed smoker must bring his will into action and keep it there, to enable him to resist the offered cigar, the handy pipe, or the convenient cigarette.

Interest is the opposite or reverse of habit. (Note the difference between "converse" as applied to accommodation, and "reverse" as use in connection with interest).

The functions of habit are:

1. Biological,
2. Psychological.

Biological results of habit.

1. It makes for accuracy—as in shooting;
2. It increases speed, as in adding, or type-writing;
3. It saves energy, by cutting out unnecessary movements;
4. It lessens muscular fatigue, for the same reason;
5. It makes for certainty of action.

Psychological results of habit.

1. It diminishes the necessity of attention;
2. It makes for contentment;
3. It lessens mental fatigue;
4. It gives confidence.

Rules for habit-forming. James' rules are:

1. Get initiative,
2. Get practise,
3. Allow no exceptions.

Kinds of habits. Habits may be either,

1. Active (calling for skill, capacity, trained ability), or
2. Passive (merely effortless).

Uses of habit. It has a double use:

1. To enable the soul to hold its own against external activities; to master mere impulses;
2. To give intelligence and will time and chance to accomplish new and higher things.

Formation of habits. A habit is such a train of associations that if one comes into consciousness, the others follow automatically. We stand and walk from habit; at first, however, we had to give our attention to each successive pose and movement.

Utilizing the inertia of habit. There is a certain amount of inertia—that is, resistance to being started in motion, if still—which may be overcome and turned into that other and more desirable kind which is resistance to being stopped, when once in motion. It is up to the management of a manufactory to overcome the first kind, and to set the minds of the workers in motion at the proper speed and in the right direction. This done, they will continue until slowed down by bad management or by other causes.

Powers are:

1. Latent habits,
2. Possibilities of forming habits.

Capacities are qualities which under proper conditions would produce powers or habits. One may have a capacity for mathematical calculation, or for public speaking.

Idea associations are thought habits; as where a certain mental state calls up another particular one.

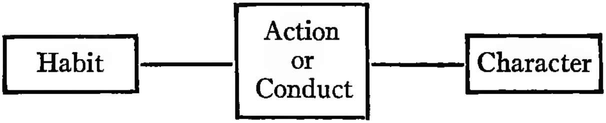
Habits from instincts and capacities. A child's sucking his fingers, or crying to be taken up, are examples; so is a cat learning to open a door by springing on the latch; or a cow opening a gate by unhooking the fastening with her horn. The habit results from the satisfaction ensuing from the first and successive actions.

Advantages of habit. It
1. Facilitates right conduct,
2. Saves power,
3. Aids the intellect, particularly in regard to:
    a. observation,
    b. memory,
    c. reasoning,
    d. aiding association,
    e. broadening knowledge,
4. Generally aids education.

Disadvantages of habit.
1. It arrests development,
2. It is poor substitute for initiative under new conditions,
3. It strengthens conventionalism,
4. Habits, if bad, prevent the acquirement of skill, just as incorrect rote learning hinders subsequent correct learning.

Overriding habits. A habit—as of a soldier's obedience to command—which results from a very slight stimulus, may be overriden by a stronger, unexpected or diffuse stimulus.

Relation between habit and character. Habit is said to be the middle thing between action or conduct on the one hand and character on the other, thus:—



On the one hand, habits are habits of action; on the other, moral character is called "a bundle of habits."

Habit is the stuff of which character is made. Character is known by conduct; conduct results from habit.

Habits of animals. While the dog of to-day turns around and around before lying down, because his ancestor, an Australian dingo, did so in making himself a bed in the grass; the squirrel makes believe to bury nuts in a cage or under a carpet; the mateless bird collects nest material, the lower animals act mostly by instinct. But the higher we go, the fewer instincts and the more habits. Plants, even, have some traces of habit—for instance, normally they grow fastest at night, and if night be turned to day artificially, continue for a time to sleep and grow by the clock.

The influence of habit. As Carpenter puts it, "our nervous systems have grown to the way in which they have been exercised, just as a sheet of paper or a coat, once creased or folded, tends to fall forever afterwards into the identical folds."

Habit is thus a second Nature; or rather, as Wellington said, it is "ten times Nature."

Habits are essential to action. As proof, let a Chinaman try to pronounce our letter *r*, a Japanese our *l*, or either of them the Hollander's *sch*.

No one can be efficient who is not a mass of habits. Talking, walking, are habitual. Long imprisonment or marooning may take away the ability to talk, although that of thinking continues; long-continued illness compels one to learn again that wonderful balancing action required in walking. We dress rapidly by purely habitual actions. A man ties his own necktie rapidly and accurately, but when called on to tie another's has to do it from behind, because the complicated motions are performed habitually. A man may become a habitual smoker, or stutterer, liar, or kleptomaniac, or may lose his temper on the slightest provocation, simply because each act of any kind fore-runs similar ones.

Many are honest more from habit than from innate goodness or altruism. When one has habitually felt and expressed love or hate, jealousy or geniality, the movements of the inner face muscles impress themselves in the skin and outer muscles, and the character shines out on the face.

The laws governing habit.

1. A starting motive is required,
2. The necessary original will decreases with repetition, and gradually disappears,
3. Repetition strengthens habit,
4. Regularity increases the effect of repetition,
5. Children acquire habits more readily than adults because their minds are more plastic.

The habit of work. We often hear that "stopping work was the death of him." This, while only figuratively, is literally so; the work habit having become imperative.

Educated habits. One may strengthen habits by either intentional or unintentional practice. Thus, a philanthropist's secretary may become highly altruistic; the Mexican bandit or the Chinese pirate even more unscrupulous and ferocious; the *roué* more lustful by frequent attendnace on sex dramas.

"Habit is thus the enormous fly-wheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to trade therein. It keeps the fisherman and the deck-hand at sea through the winter; it holds the miner in his darkness, and nails the countryman to his log-cabin and his lonely farm through all the months of snow; it protects us from invasion by the natives of the desert and the frozen zone. It dooms us all to fight out the battle of life upon the liens of our nurture that disagrees, because there is no other for which we are fitted, and it is too late to begin again. It keeps different social strata from mixing. Already at the age of twenty-five you see the professional mannerism settling down on the young commercial traveler, on the young doctor, on the young minister, on the young counselor-at-law. You see the little lines of cleavage running through the character, the tricks of thought, the prejudices, the ways of the 'shop' in a word, from which the man can by and by no more escape than his coat sleeve can suddenly falls into a new set of folds. On the whole, it is best that he should not escape. It is well for the world, that in most of us, by the age of thirty, the character has set like plaster and will never soften again."—*William James.*

QUESTIONS 141 TO 160

141. What physical environmental influences most affect your present work and aspirations?

142. What can you suggest to combat them successfully?

143. What climate seems best adapted to furthering active intellectual and business life?

144. Does any article of attire handicap you in your work? If so, which article and what work?

145. Is there any article of office furniture which is a hindrance to you or those about you?

146. What is the difference between habit and instinct?

147. What useful physical habit have you?

148. Mental?

149. What habit have you, which it would be better to abandon?

150. Name some of the beneficial results of habit.

151. Some of its advantages.

152. Disadvantages.

153. By what means can a habit be temporarily overridden?

154. What are the relations between character and conduct? and conduct and habit?

155. What are the five laws of habit?

156. Give an example of a habit strengthened by education and environment.

157. How would you cure a boy of the habit of chewing gum with his mouth open?

158. Of bragging?

159. Give an instance of a good habit acquired unconsciously by example.

160. Of a bad one.

LESSON IX

TIME—FATIGUE

We have seen that one of the objects in **planning** is to rid ourselves of inconvenient and hurtful habits, and acquire new and helpful ones; also to accustom ourselves to unfavorable environments, and take advantage of those which are conducive to our attainment of our praiseworthy ideals, both major and minor.

We might now with advantage take up two topics—**Time,** and **Fatigue**—to learn how to appreciate the first at its true and great value, and how to recognize, avoid, or recover from, the second. While not directly and logically connected, they will be taken up in the same lesson.

Time, the great mystery and miracle. Bennett says very aptly:—

"Philosophers have explained space. They have not explained time. It is the inexplicable raw material of everything. With it, all is possible; without it, nothing. The supply of time is truly a daily miracle; an affair genuinely astonishing when one examines it. You wake up in the morning, and lo! your purse is magically filled with twenty-four hours of the manufactured tissue of the universe of your life. It is yours. It is the most precious of possessions. A highly singular commodity, showered upon you in a manner as singular as the commodity itself.

For remark:—No one can take it from you. It is unstealable. And no one receives either more or less than you receive."

The value of time. Time is really our most precious asset, because, unlike gold, unlike experience, unlike education, the supply is strictly limited. Each new day there is more gold in circulation and use than there was the day before; each day, the sum of our experience is, or at least may be, greater; each new day, those who enter upon an education in any line of work have a larger account on which they may draw. But while the experience and educational facilities are the result of time spent, there is only so much time each day. Each second is a jewel offered us just for a second; if we do not take it then, it is snatched away, never to be offered again. Hence Time is pictured as an old man —nothing is older—with a forelock; and we are told that we must grasp him by that forelock, or he will escape us irrevocably.

Longfellow tells us that "Art is long and Time is fleeting;" Scott, that "Time rolls his ceaseless course;" Burns, that "No man can tether time or tide." But not only the poets sing the praises of time. The great world historian Plutarch relates that: "Pythagoras, being asked what time was, answered that it is the soul of this world."

Time-supply. It is curious that we are so wonderfully particular about getting exact weight when we buy a pound of butter or of cheese, and of getting every cent of return change that should come to us, when we tender a dollar bill after buying 67 cents' worth of anything—yet are so abominably careless and indifferent in getting the full value of every minute that has been apportioned to us gratis. The employee resents any attempt to cut down his half-hour lunch time to twenty-five minutes; but as to the time which belongs to him of right, instead of being merely accorded to him by contract, he "doesn't care a hoot." Members of a family will go to law about the division of a legacy—insisting on getting the last cent, and then some; but each of us has had left to us twenty-four hours, and it never occurs to us to take the trouble to go after them and take them—without a law suit or even proving the will.

" Supply cut off." We hear wails more or less heart-rending and also more or less sincere, from manufacturers and dealers, that their supply of dye stuffs and all sorts of things is cut off by reason of the war in Europe. All very well. But how about the limited supply of time that we have? When do we get up in the morning? The best part of the time supply is that during daylight hours. But we wait until the sun has been up from one to three or four hours, then get up and rush as if the devil was after us, in order to get down to business. The time that we get by gaslight or electric light is not worth so much as that which we spend in bed. We are just as foolish as if we neglected to get first-class products from abroad and ordered only seconds, and then complained that our supply was limited.

" To save time is to lengthen life." "That no invention of any of our wizards of science can crowd more than 24 hours into one day" is disputed in the Remington phrase "to save time is to lengthen life;" but after all this is but a phrase that must be read between the words, or considered as poetic license. As far as giving us facilities for accomplishing the increased tasks laid on us in this generation is concerned, those inventions do always somewhat, and sometimes largely, keep pace with the demands on our time and our nervous and physical forces.

The old saying: "there is no royal road to learning" is for us of to-day at least obsolescent, if not entirely obsolete. The roads most worthy to be called "royal" are the level unhindered stretches between points once diversified by hills and valleys; with bridges where once fords were at times impassable; roads that pierce obstacles around or over which our forefathers had to wind or climb.

"Carpe diem." A good old Latin motto (they were quite efficient, those old Romans, for many centuries) was "*carpe diem*," "seize the day." They seized a good many other things in their time; and a good part of their undeniable, their wonderful success, was due to the fact that they utilized their time to the full, and that when they had made up their minds to do anything they "got a good ready on" and seized the proper opportunity, all in good order and without delay. This motto is worth emblazoning over our portals. The Jews have a touching custom of attaching texts of the Law on little slips of parchment to their door posts; and I think it would be worth while for us to have such mottoes, and to notice them. Perhaps if every child was shown these little mottoes three times at intervals, and spanked vigorously each time, he would remember them oftener. That is the way the ancient Spartans impressed on their children the position of the boundary lines. They were whipped at every conspicuous stone or tree all around the border.

Improve it now. If we wait six months or a year before we take action on some fault that is brought to our attention, we are exactly like the man who sued another for slander, alleging that he had called him a hippopotamus six months before. When his lawyer asked him why he hadn't taken action six months before, he replied: "I never saw a hippopotamus until two weeks ago."

Judging time. Just as some persons are color blind, and others do not know one musical tone from another, so there are those who can not estimate time without a watch or its equivalent. They have no idea whether it takes five minutes, or ten, to reach the railway station, write a letter, shave, or do any one of the thousand and one things which go to make up their daily life, unless they have had occasion to measure those times, or have had them measured for them. And just as it is a misfortune to be tone deaf, and a pity (often indeed a danger) to be color blind, so it is a misfortune, and may cause loss or annoyance, to be ignorant of the time required to do this, that or the other thing which must be done for one, or by one.

Where this faculty of judging time exists, it must be exercised; we must take estimates and measurements, compare the estimates with the measurements; and where desirable, record the results.

Ask the next salesman whom you see, how long it takes, on the average, to sell a collar, a shirt, or whatever he has to sell. He will not know. Ask his employer—most likely he will not know, either. But both should know. Of course, the requisite time depends somewhat on the goods, the price, and the customer; but very largely it is the salesman who delays the clinch. If the customer states exactly what he wants, the salesman is inattentive or indifferent, and hands down something else; on the other hand, if the customer does not formulate his wishes in detail, the salesman should find out in advance before he touches an article. Otherwise he wastes his time (which is his employer's), and that of the customer; very probably also that of other customers who are waiting their turn to be served.

The sense of time may be tested in several ways. One is to play a piece of music part through, the regularity being gaged by a metronome; then cause the subject to count to himself, beating time the while, for a certain number of bars, at the end of which time the music is started again to see whether the subject is ahead of or behind the correct time. Another is for several observers to start some well-known song in unison, then to stop and beat time mentally during two lines or so, and start on the next. An astonishing difference in conception of time will be shown.

The sense of elapsed time. Some persons can neither form a knowledge of the time that it has taken to do some certain things or thing, nor deduce that needed to do some other. Thus:—the time required to walk ten Avenue blocks (2,000 feet) in New York. If one does not know this, one can not figure how long it will take to walk from 8th Street to 42d, for instance.

Where this sense is defective, it should be helped out by test data; for instance: one notes that such a block is say 90 single steps; now the average man's step is about 27½ inches; so that 90 steps would be 92 x 27½ ÷ 12 = 206. As one makes say 120 steps a minute, each block would take 90 ÷ 120 = 0.75 minute. Or, say 200 ft. per block at three miles an hour, that is 20 minutes per mile of 5,280 feet, or 20 ÷ 26.4 = about 0.75 (that is, ¾) minute per block.

Guess how long it takes to bathe—to shave—to dress completely, etc.; then note the actual time. You will see what your "personal equation" is, in the matter of time.

Efficiency in trifles. In hardly anything we do we cannot make an improvement as regards betterment or time saving. In such a trifle as shaving oneself, efficiency may be increased by stropping the razor each time—for I think that if patent safety razors were really better than the old-fashioned kind, all barbers would use them. Efficiency may be further increased by giving the lather time to act on the beard. Now here is a point where compound efficiency may be attained. Strop the razor while the lather is softening the beard. That is only a little thing—but the man who applies the principles of efficiency to little things will at last find that he does it instinctively in all things, both great and small.

"Waste" time. No time is wasted, that is spent in retrospection and planning. It may be the best spent time in the day. Take a girl who minds the telephone desk in an apartment house. If she puts in time asking every one how she may best improve her condition, by practising to be a stenographer, or by learning housekeeping, etc., she is utilizing the time to good advantage (provided, of course, she follows up some one advice given). Time spent in the office, sizing up one's fellow-workers and those who come in, so as to gain a knowledge of human nature, is not wasted, even although the pen may be laid down.

Classification of time wastes. We may classify time wastes in several different ways—among others by their causes. We may distinguish them as caused by:

1. Ourselves,
2. Other people,
3. Circumstances other than personal.

For time wasted by ourselves, blame can be laid in only one direction.

When others lose too much time for us by keeping us waiting, or giving us wrong information or instruction, we have our choice between protesting against being robbed of what can never be recovered, and ceasing business or other relations with the robber.

Where time is lost through weather or other causes against which no one can put up a fight or make a protest, all that we can do is so to alter our arrangements as to provide as far as possible against future delays from the causes in question.

Freedom from interruption. It is all very well to plan freedom from interruption during certain hours or fractions of an hour; the difficulty is that,

> "The best laid plans of mice and men
> Gang aft agley."

as Burns hath it. Callers, the telephone, etc., interfere with the best planned schedules. It is possible to have "buffers" in the outer office, to hold off bores, canvassers, etc., in the time which must be devoted to work or study.

But then there is the 'phone (likely to break in upon the most sacred hours). About the only way to do away with this evil is to have a buffer at the 'phone and to be where you can not hear the bell. I am not sure that it would not pay to cut out the 'phone entirely during certain periods each day, and to have this fact understood by means of one's letter heads, etc. If we have regular office hours when we may be reached in person, why not regular telephone hours? Some have 'phones under fictitious names, so that they may be reached only by those "in the know."

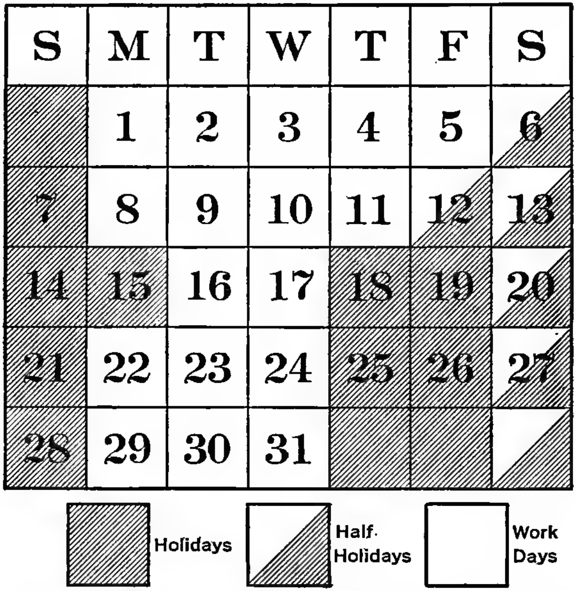
The innumerable letter deliveries in large cities hinders unbroken work according to schedules; as correspondents are impatient and customers wish their orders filled "at once, if not sooner." For this reason, it would be well for the average business man, who can so arrange his affairs, to have two work places—one where he can be reached by the public, the other where he can not.

Train time. Many a one who goes regularly to business says: "Oh, if I only just had half an hour that I could call my own!" But how about the half hour in train or boat? Absolutely neither telephone nor callers; nothing to do but to think—or read something consecutively—if one only wished. For the reading scraps contained in the newspaper there are numberless time scraps all through the day. It is not absolutely essential that we shall find out at once that the Teutons have walloped the Slavs (denied within 12 hours) and the Red Sox whaled the Blue Skirts, and Battling Bruiser battered Gunner Gubbins, and Mrs. Galt bought her—ahem!—*lingerie*, and Amalgamated Taffy gone up to 1105, and that the Suffs "have not lost what they never had" and that Eugenia Roney will marry Tango Bill at 12:07 November 2d—just in that blessed half hour all in one piece. Devote it to learning Spanish—or reading history—(or learning geography) or reading a good novel—or thinking out the days' work and the evening's pleasures? Leave the paper for the odd moments. In other words, eat your meal at meal time, and crack peanuts or munch apples at odd moments.

False economy of time. When some noted Japanese personages were in New York, they were being hurried about at great rate, so that every fragment of their very short time might be utilized. But very little judgment was shown in the matter. On one occasion they were almost thrown from a local subway train into an express; and when the New York guide had caught his breath he said: "We saved four minutes by that." One of the visitors replied in wonder: "But what shall we do with the four minutes?" All that they had done was to get three hours and four minutes at a given point of interest, instead of only three hours. That was a case of false economy, just as bad as that showed in spending ten minutes' time of a man costing fifty cents an hour, that might be better employed, untying a knot in a piece of string worth about a quarter of a cent when straight.

Reason for time recording. Why should we pay particular attention to measuring, recording and saving time? Because each minute is like the last match; if wasted, it can not be remade or regained. Because time is of the very essence of all things; is what we buy or sell more than anything else; and in fact practically everything we buy has been purchased originally by an expenditure of time, whether or not accompanied by great physical or mental effort. We can not store our time, as we can our fuel, until we need it, or think that it is time to use it; we must take it as it flies.

The most important part of the day. Most of us are inclined to consider that part of the day devoted to our daily task of earning money, or whatever it is which takes up eight or ten hours regularly either at home or away, as the most important third or other fraction of the day. It is not. It is just as though we considered the stomach of primary importance, compared with the lungs, heart and other organs. We are alive 24 hours of the day; and each hour is just as important as the other 23, if we will only make it so.



S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Holidays
Half Holidays
Work Days

Time lost through holidays. The time lost through holidays, religious or otherwise, is graphically illustrated by a leaf from a calendar of 1913, showing five weeks, namely October with the September and November days required to fill up the full 35. The amount of time lost is 15 days, or 42.9%; of which Sundays account for only 14.3%; leaving 18.6% for "extras."

Fatigue. One of the principal objects of studies in personal efficiency is to eliminate fatigue and determine the amount and frequency of rest periods—so that with the least possible effort one may accomplish any given task.

What is fatigue? It is decreased work capacity, due to long continued or excessive work.

Causes of fatigue are:

1. A poison produced in the blood by chemical changes in the muscular tissue;
2. Lack of tissue for oxidation,
3. A change in the nerve cells,
4. An accumulation of waste product in the muscles.

No one can be physically efficient, who gets unnecessarily fatigued, or continues to work immediately after getting tired.

The chemical products of fatigued muscles are:

1. Carbon dioxide (CO_2); the same gas that is produced by the perfect combustion of carbon, and in our breathing;
2. Lactic acid, which is the acid of sour milk;
3. Acid potassium phosphate.

The last two will cause artificial fatigue of any muscle into which they are injected.

Scientific study of fatigue. In recent years, scientists have taken up the study of the causes, effects, and prevention of fatigue; and the results of their investigations have been applied successfully to mitigating the burdens of mental and muscular work, and generally increasing the efficiency of mankind. The necessary studies have been made both on men and on the lower animals; in the first case at considerable sacrifice of time and comfort on the part of the subjects. As a result we have learned, principally, how to avoid excessive fatigue and its temporary and permanent evil results.

The scientific study of fatigue is necessary because either mental and muscular work is the result of chemical changes in the mental or muscular tissue, and fatigue is the result of these alterations. Both these changes and the restoration of the original condition of the tissues take time.

Mental fatigue is but little understood; there being but little physical change in the brain, even after hard mental work. Possibly fatigue poisons are carried from the muscles to the brain, causing drowsiness. There is one kind of brain fatigue, called interference, in which several dissimilar acts are to be performed in rapid succession, and one intereferes with another.

All that we can do is to avoid mental fatigue by studying the relation between work performed, fatigue experienced, and the necessary rest periods to restore normal conditions.

From its very nature, mental fatigue can not be studied so exactly and thoroughly as physical; very largely because in this instance the use of the lower animals as subjects is out of the question; also because in using human subjects the results of mental fatigue lessen the subject's capacity to appreciate and describe or record his changing conditions. We do know, however, that certain mental operations, as mathematical calculations, are more fatiguing than others, such as memorizing; and that the solid contents of the urine, after severe mental work, are in quality and character in some degree a measure of the intensity of that work.

We have also learned the value of rest periods in mental work, and how to find out the best length and frequency thereof for each character and intensity of mental work.

The effects of mental fatigue are twofold:—

1. To diminish capacity,
2. To increase efficiency.

These take place simultaneously. During work, efficiency increases more rapidly, and lasts longer, than fatigue.

Physical fatigue is caused by the accumulation of the results of the chemical changes in the muscles when they do work. Nature notifies us by our languor, when their quantity becomes excessive. Then it is time to rest, in order to wait until they are removed by the regular processes of the system. The poisonous products of work enter into the blood and cause headache and illness, and even death if allowed to accumulate to too great an extent.

The signs of fatigue are:

1. Tired muscles,
2. Headache, or
3. Muscular or mental lassitude.

A fatigued feeling before beginning work is no sign of inefficiency.

Relaxation. The brain and muscles need to be relaxed from time to time, just as does a bow, a violin string or an automobile tire. For this reason, business men who are under great mental strain during the day go very probably to see and hear foolish pieces at the theater, instead of Ibsen or Shakespeare. The Delsarte fad which interested fashionable women many years ago was really beneficial, as the principal doctrine was complete relaxation of all the muscles of the body. It was intended to give grace, and did give rest,

What is rest? Rest is simply restoration of the waste and elimination of the work products. It is a great error to suppose that muscular work rests one after mental effort. On the contrary, an experiment as to the length of time in which one can do any muscular work when fresh mentally, and again when tired mentally, will show that the poison must be worked out of the system, when caused by partial break-down of either the brain or the muscles.

How long shall we rest " in between? " The best researches show that where the work is very heavy about 35 to 40 per cent of our "work time" of eight to ten hours should be spent in short, properly distributed rest periods, in order to get the greatest efficiency. That distribution of rests which gives the best results must be determined by experiment for each kind of work. Moses ordained one day in seven; modern efficiency experts call for breaking up the day's work in the same way. If the average office worker would look out of the window once in a while, he would get more work done and make fewer mistakes than if he were strenuous. Goethals said that the work at Panama went better when the men stopped now and then for a sandwich.

Efficient work periods depend for their length and frequency upon:

1. The person,
2. The work,
3. The methods,
4. The conditions,
5. The pre-observed effects of fatigue,
6. The incentive.

Change of work is no rest (despite the popular belief to that effect) any more than spending money for clothes restores a bank account depleted by outlays for food. But turning from hard work to easy causes less fatigue than if the hard work is continued for the same length of time. Effective mental work can not be done when one is tired muscularly; and the converse.

The necessary amount of rest during the nominal work-day depends on the work itself, the worker, etc. For a man doing very heavy work it is 35 to 40 per cent of the eight, ten or other number of hours. The greater the number of relaxation periods, the better. Moses laid down the first rest period. When the French tried to make it one day in ten instead of in seven, this was found insufficient. Japanese office workers are said to rest from time to time by lying down. This "brushes the cobwebs from the brain."

Sleep is the best of all relaxations. We should, however, take it at such time as to give more daylight for our work. Civilization is gradually shifting the waking hours to include the dark periods; this is disadvantageous, and makes for inefficiency. The proverbial "beauty sleep"—that which comes before midnight—is really the best. In sleep the blood pressure is lowered, the breathing slowed, the nerves calmed, the waste eliminated and the tissues repaired. There is a physical and a psychological reason for "early to bed and early to rise." It is not necessary to put the naked body in the glare of the hot sun, to get a sun bath; the healthful light will bathe the body through the clothes—and the latter, too, should be well sunned.

QUESTIONS 161 TO 180

161. Why is time our most valuable asset?

162. How could we manage to utilize the daylight hours more simply than by the silly way of setting the clock ahead?

163. How long should it take an average typist to write a twelve-line letter with a two-line address?

164. What is your time worth per minute?

165. How can you test your sense of time?

166. Give an example of idle time which is not wasted.

167. Of work time which is wasted.

168. How much of your time has been wasted in reading immaterial paragraphs in the newspaper, this morning?

169. Why should you keep a record of the use to which each unit of your time has been put?

170. What are the causes of fatigue?

171. What is the first effect of mental fatigue upon the subject's efficiency?

172. What are the three signs of physical fatigue?

173. As a general rule (other things being equal) is it better to rest two half hours or one full hour?

174. Is change of work rest?

175. On what do the length and frequency of rest periods depend?

176. How long should a man doing eight hours heavy work, like shoveling coal, rest?

177. When should sleep be taken?

178. Do old people need more or less sleep than young ones?

179. Is the brain at rest during sleep?

180. Does music during work lessen fatigue, or not?

LESSON X

MEMORY

The subjects of **Time** and **Fatigue** having engrossed our attention in Lesson IX, the important theme of **Memory** is our next consideration and study. It is a topic about which many volumes have been written, and many discourses held, since the mind of man, its workings, possibilities and limitations, have attracted the attention and been the object of the investigation of philosophers and others, curious to find its seat, to extract therefrom its secrets, and to master its laws. The accumulated results of their researches and deliberations are at our disposal, for us to apply in increasing our efficiency, and thus bettering our material condition—to say nothing of adding to our intellectual treasures.

Memory:

1. Is our most important faculty,
2. Guides our future conduct,
3. Adds to present pleasures.

What memory does.

1. Reinstates, or is conscious of, a previous existence,
2. Recognizes it as previous.

Memory involves

1. Learning,
2. Retention,
3. Recall,
4. Recognition.

Thus: to remember anything we must first **learn,** then **hold,** then **recall** it; and finally **recognize** it as:

1. Past, not present,
2. Definite, not a dream,
3. Having had a certain time and place.

Apperception and retention. Apperception is the mind's action on the material presented thereto; retention is the converse. Apperception is receiving material; retention is the latter's effect on the mind.

A baby, a savage, a peasant, and a chauffeur, all see an automobile traveling at full speed. The baby is frightened, the savage wonders and perhaps fears, the peasant knows in a general way what it is; the chauffeur understands it in detail. All have the same sensations, but four different apperceptions. If the chauffeur explains the machine to the peasant, the first time the latter sees it standing still, he retains the information.

With what we retain from one or more experiences, we apperceive afterwards. Apperception, then, is interpreting new experiences by old ones; simply expressed, just *learning;* for we learn what we apperceive.

Registration without retention in memory would be like registering a fact in ink which would fade out completely, so that when we needed the record, we would not have it.

How to learn. We can learn anything only when

1. The material is properly presented,
2. The mind is properly prepared to retain it.

Kinds of memory. Memory may be either

1. Rote or
2. Logical.

Rote memory connects successive elements and recalls from one to the next in regular turn; as with nonsense syllables.

Logical memory is more rapid, usual and useful; it calls for understanding.

Where rote memory is applicable.

1. Unconnected things, as dates and dimensions,
2. Quotations,
3. Formulas,
4. Definitions.

Where rote memory is inapplicable.

1. Grammatical exceptions,
2. Geographical data.

Disadvantages of rote learning.

1. Its associations are only sensuous—sound or appearance, not ideas,
2. It leaves the mind passive,
3. It burdens the mind,
4. It induces mind wandering.

Why logical learning is advantageous.

1. In logical learning we usually know part of the material already;
2. There are more facts than principles; and the latter are used over and over again with countless new facts.

Easy verbatim learning. The reasons why it is better to read or hear the material in its entirety than in sections are:

1. No time is lost in unlearning the associations between the first and the last part of each unit;
2. Some parts, being learned sub-consciously from the beginning, do not require re-learning.

Bergson distinguishes between two sorts of memory:—

1. One which repeats,
2. One which imagines.

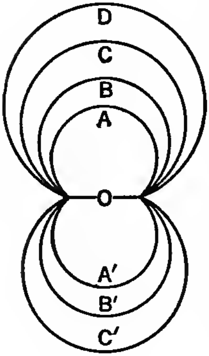
Repetitive memory records every event of our life, and enables recognition of experiences.

Imaginative memory "does not represent the past, but merely acts it, prolonging into the present the useful effect of by-gone images which have been conserved."

Learnt memories are more useful and more remarked than the others.

"Memory circles." We might say that memory consists of a series of eccentric circles, as under:—the smallest, A, nearest the perception, containing the object O, with its overlying after image; the larger ones, B, C, D, corresponding to growing efforts at intellectual expression, and to deeper strata, B′, C′, D′, of reality.

"The largest plane of memory includes all our past, and is the plane of dreams." (Bergson).



Recognition assigns a time and a place to recalled facts. We may recall a person's face, but neither "place" him, nor recognize him as belonging to a certain period of time. Recognition frames and inscribes the memory picture.

Three factors of recognition are:

1. Arousing associations,
2. Exciting familiar movements (these two together forming)
3. Pleasantness.

Illusive recognition is that sort in which we think we have seen or done a thing before, when we have not. Two theories are that:

1. One side of the brain remembers what the other has just learned;
2. Some parts of the situation, resembling parts of old situations, give the impression that all are old and familiar.

Quality of memory. Some persons remember dates readily, others names, others musical airs, etc. A phenomenal memory for any one class of impressions is no indication of genius; indeed, may be an attribute of idiots. Memory and philosophy together make for genius and efficiency.

Kinds of memory. Kant recognized memory as either:

1. Mechanical	depending on	contiguity
2. Ingenious		fanciful similarity
3. Judicious		natural similarity

We may also classify it into:

1. Local,

2. Rational,
3. Representative or imaginative.

Local memory depends on things seen at the time of the impression. We remember a remark in connection with the place where it was made.

Rational memory depends on ideas had before, and associated therewith. Thus the criminal lawyer remembers decisions in criminal cases more readily than those in civil matters.

Imaginative memory depends on a strengthening of the original impression. We remember strongly outlined pictures or words more readily than faint ones.

Memory's stream may either,

1. Run straight,
2. Meander gently, or
3. Twist sharply.

Accordingly, our memories are either

1. Merely continuous reproductions of former impressions, as in verbatim learning, or
2. A recombination of impressions very slightly linked together, or
3. A recombination linked by very strong associations or emotions.

For instance: a certain railway station recalls an accident there—a similar one in Rheims—its cathedral—an Australian friend with whom I visited that building—Sidney harbor—its frozen meat export—the Pictet ice machine there used—its New York agent—his actor brother—Sarah Bernhardt—wooden legs—Dr. Palmer, the inventor of modern artificial limbs—our civil war, etc.

But where the mind comes back repeatedly to the same idea—"that way madness lies." Thus—Rheims—its cathedral—archbishop—*Rheims cathedral*—Architecture—Sir Christopher Wren—St. Paul's—*Rheims cathedral*—the horrors of war—Louvain—*Rheims cathedral*—invasion—American defense of New York—

danger to sky scrapers, cathedrals, etc.—*Rheims cathedral*, and so on.

Associations. Our thoughts run naturally in channels. Thus "knife" suggests "fork" to one, "pencil" to another. A B C D E F suggests G H I, but ABADDEF may suggest EFfort, EFfect, or EFficiency.

Associations are the principal aid to memory.

Convergent and divergent associations. An idea with several associations—as in the case of a poem which has rhythm, rhyme and alliteration—is easy to recall; but like forked roads, similar rhymes may mislead one. Associations that help each other are called convergent; those which cause distraction, divergent. They do for the recall what attention does for the original impression.

Succession of ideas must be not only sequence, but association; and must be studied under three heads:—

1. Its conditions,
2. Its varieties,
3. Its results.

Selection of associations. Why should an impression suggest one object rather than another? For instance, in the foregoing example, why did Sydney harbor suggest frozen meat, rather than kangaroos? Why should "cat" suggest "dog" rather than "mouse," and "man" suggest "wife" rather than "woman," or the other way about? In other words, what are the laws of association in connection with memory?

The connection may be either:

1. Objective, or
2. Subjective.

Objective conditions of association. These are :

1. The strength of the original association;
2. Its frequency,
3. Its recency;
4. Its being the first one.

The strength of the original association depends on:

a. The intensity of the original physical stimuli,
b. The amount of attention at the time of the association,
3. The person's emotional condition then.

Subjective conditions of association. These, giving ideas of greater variety and flexibility, are:

a. The momentary attitude or purpose,
b. Education,
c. Social pressure,
d. Heredity.

Conditions determine what to do with two contiguous ideas. If of two number pairs, one above the other, one pair represents expenditures, while the other consists of a debit and a credit, one adds in the first case, subtracts in the second. Asking for a synonym for "good" you probably get "excellent" while for an antonym one will doubtless get "bad."

Kinds of associations. We can classify associations into those

1. Of contiguity (external),
    a. in time,
    b. in space.
2. Of similarity or of difference of kind (internal).

Association by contiguity. In a sentence of five words, the fourth remains in the memory as the fifth commences; but while the fourth helps us remember the fifth, the fifth does not help so much with the fourth. (Note the difficulty of repeating any seven letters of the alphabet, backwards.)

If an Italian studying English from a German text book learns that "*Frau*" means "wife," and so on, he will eventually translate more readily from German into English than the reverse. Thus we learn that sequence is of great weight; it is in fact the first aid to memory, developed. Hence, children learn nonsense rhymes more readily than adults do. (Women are better in this respect than men.)

One public building suggests the square on which it stands, or the next building; one event of yesterday suggests the one preceding or following on that day.

Association by similarity has the advantage of offering many points of resemblance between the idea to be remembered and the aid. We remember the Hungarian for "who" (*ki*) because it is like the French "*qui*" for the same idea; we keep the German "*Stuhl*" for "chair" in mind, because of the English "stool."

Similarity is illustrated when a portrait calls up the original. It may be in

a. Appearance,
b. Meaning,
c. Use,
d. Sound,
e. analogy, etc.

Association by dissimilarity enables us, for instance, to remember Mr. Long's name because he is short.

Contrast or dissimilarity as a factor in association is seen where day suggests night, or a mountain calls up a valley.

Association by similarity is more important than by contiguity. Seeing a lion and a tiger in adjacent cages would be less important than considering them both as of the cat family.

Classification of associations. These may be

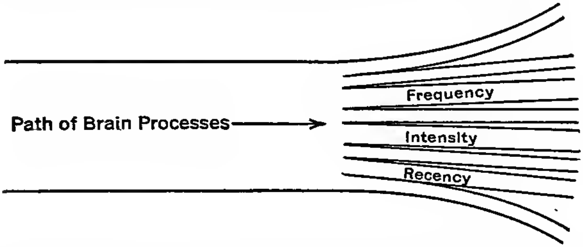
1. Objective, in regard to
    a. space,
    c. substance and quality;
2. Subjective (logical; intellectual) in regard to
    a. identity,
    b. equality,
    c. resemblance,
    d. unlikeness,

e. opposition,
f. part and whole,
g. cause and effect,
h. cause and result,
i. concession.

Factors in association. The mind follows the most easy path of association. Among these are:

1. Frequency,
2. Intensity,
3. Recency.

This may be illustrated by a diagram as follows:



Thus among several persons who had been entertained by the Dupont family near their works at Wilmington one might remember his visits by their frequency, another by an explosion which took place during his only visit, and a third solely on account of the visit having been made quite recently.

Associations with any one thing may be very widely different. Thus "90°" suggests to one person, a temperature; to another, two lines at right angles; to another, a degree of purity or strength, as of alcohol; to still another, a quarter of a circular arc.

Conditions of association. In general, any two ideas, once connected, recall each other mutually. Thus: if American Independence suggests July 4th, that date will suggest American Independence; if "*Pferd*" suggests "horse," then "horse" may suggest "*Pferd*."

Tests for association. The capacity for association may be accurately measured, (a New York judge to the contrary notwithstanding) with respect to

1. Speed,
2. Kind,
3. Re-inforcement,
4. Correctness,
5. Persistence.

For instance, for speed, a person may be given a definite time in which to speak disconnected words suggested by a key word, and the number noted be recorded; or the time may be noted, needed to speak a given number of suggested words.

The six laws of memorizing. All learning is by association; and

1. Retention depends on the number of repetitio (even after one is "letter perfect");
2. Capacity increases up to maturity, then decreases;
3. Repetition should be with interruptions; the longer the better;
4. Repetition should be of the whole material, not of successive bits;
5. The rate of repetition varies with the individual. (Probably 200 syllables a minute is the average);
6. Rhythm aids; rhyme helps still more.

Seven laws of retention.

1. Forgetting is rapid at first, then slower; up to a maximum.
2. Re-learning is more easy than first learning.
3. Sense is better retained than nonsense.
4. The material must have time to "soak in" before the mind is otherwise engaged.
5. Incorrect learning hinders subsequent correct retention.
6. All associates are retained together. (The last

word of a rhymed line is hard to retain without the rest.)

7. "Quickly learned, slowly forgotten;
   Slowly learned, quickly forgotten."

Two laws of recall.

1. No idea can be recalled without its associated idea or sensation. (Better learn each idea with more than one association.)
2. Recall demands a correct attitude toward the sensation.

Two ways of remembering. Memory always calls for associations; but we may divide these into those for

1. Single things,
2. Groups.

Remembering single things is effected by connecting them with letters or words. (Queen Elizabeth's death year is contained in the initials of the words: "My Day Is Closed In Immortality" (MDCIII = 1603). Using a consonant for each digit:—

1	2	3	4	5	6	7	8	9	0
B	C	D	F	G	H	K	L	M	N

we would have 1603 = BHND, contained in the word "BEHIND" (Elizabeth was *behind* none of her subjects in learning.) (See under "Initializing System.")

Remembering groups is treated under "Peg or Anchor System," etc.

Memory should be automatic and will be so, if the training be indirect through appreciation. If the thing or idea be perceived exactly and thoroughly, recall will come of itself.

Memory and sensation processes are the same, as proved by any one who matches colors from memory. One cannot imagine a color that one has never seen. (Try it; also with sounds and odors.)

Factors in connection with memory.

1. Importance of the object or idea;

2. Classification and arrangement;
3. Time for "setting."

Losses of memory are of two kinds:—

1. Arbitrary (of no definite class of objects or ideas);
2. According to Ribot's law—that the order in which with advancing age we lose recall is as follows:—
   - a. of proper names,
   - b. of common nouns,
   - c. of verbs.

This indicates that we should strengthen our memory for these three classes of words, before it is too late, and in the order named. Thus we may remember Mr. Taylor because he is a shoemaker; Mr. Black as a pronounced blond; and so on, through our list of acquaintances.

Visualized memories—those connected with a definite detailed memory picture—are the clearest. Visualization can be strengthened by practice. It is stronger in children than in adults, in savages than in civilized people; among so-called "practical people" than among scientists.

Aids to memory. Among these are:

1. Rhymes:—as

   "In fourteen hundred and ninety-two
   Columbus sailed the ocean blue."
2. Associations,
3. Ciphers contained in names, dates or phrases;
4. Words the letters of which, or sentences the initials of which, suggest the digits by their form or otherwise (substituting system).

The rhyming system may mislead very badly; for instance:

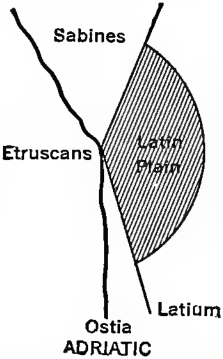
"Evening red and morning grey
Will set the traveler on his way
But evening gray and morning red
Will bring the rain upon his head."

and the other,

“Red at night
Is sailors’ delight,
But red in the morning
Sailors take warning.”

are just as likely to be remembered “wrong end to,” as properly.

The peg or anchor system fastens ideas of one set to those of another. In geography for instance, Italy is of boot shape; to remember details concerning Rome and the Tiber,[1] draw a two-legged Y, and continue the two right-hand lines into a loop. Mark in the races: Sabines, Etruscans, Latins. The foot of the left-hand leg is the mouth of the Tiber, at Ostia.



The link system (for entirely unrelated words) connects these by ear; as for instance, where in a lecture about the Romans the headings are,

Senate, Unity, Character, Organization in the Family. we have

Senate—Sanity—Unity—one man —many parts—actor [2]—character—to carry—a barrel organ — Organization — far-reaching organization — the Father’s power.

(Now take the headings in the Table of Contents of some book, and link them up on this system.)

The double link system for remembering entirely unrelated words forms a number of sentences each containing one of the words to be remembered, and the one following it; thus linking the first with the second, the second with the third, etc.

---

[1] Miles.

[2] “One man in his time plays many parts.”

As an example of its working I give a list of ten such words, and ten sentences containing them linked together on this plan.

(After reading these, make a similar series containing the next ten nouns that you find in a book or newspaper.)

1. Niagara
2. Queen
3. Pen
4. Office
5. Duke
6. Rabbit
7. Cabbage
8. Plum
9. Stone
10. Fern

1. *Niagara* is the queen of waterfalls.
2. The *Queen* uses a jeweled *pen.*
3. The *pen* belongs to the *officer.*
4. The *officer* will be made a *duke.*
5. The *duke* shot a *rabbit.*
6. The *rabbit* eats the *cabbage.*
7. The *cabbage* is more nourishing than the *plum.*
8. The *plum* has a hard *stone.*

9, 10. By the *stone* grows a *fern.*

The key-word system, like the Link System, uses the ear to make the necessary mnemonic associations, but is at once more direct and less elastic. It assigns to each cardinal number a word resembling it in sound or in meaning (for instance "Ontario" or "wonder" for one, "toe," or "tomato" for two, "tree," "tray" or "triangle" for three, etc.;) and builds sentences containing the word to be remembered and the one resembling (thus suggesting) the number. In each case there is a complete sentence; whereas in the Link System there is only a chain, however nonsensical (in fact, often the more nonsensical the better) making no grammatical sense.

As an example of the use of this system I take the same ten words that were connected under the Double Link System, and give sentences containing them in connection with the following words suggesting the cardinal numbers one to ten:—

Suggestive Words

1. Wonder
2. Tulip
3. Treaty
4. Semaphore
5. Fife
6. Sikh
7. Severn
8. Ate
9. Noon
10. Tenant.

1. NIAGARA is a *wonder*.
2. The QUEEN is fond of *tulips*.
3. This PEN signed the French *treaty*.
4. The OFFICER is working the *semaphore*.
5. The DUKE plays the *fife*.
6. The *Sikhs* do not eat RABBIT(S).
7. This CABBAGE came from the *Severn*.
8. He *ate* a green PLUM.
9. He sat on the STONE at *noon*.
10. The *tenant* is planting a FERN.

The following sentences use two suggesting words in connection with each one to be remembered:—

1. NIAGARA is *one* of the greatest *wonders*.
2. The QUEEN wears *two tulips*.
3. The PEN signed the *treaty* under the *tree*.
4. The OFFICER has worked a *semaphore before*.
5. The DUKE of *Fife* has taken a *wife*.
6. The *Sikhs* kill *rabbit*(*s*) with *sticks*.
7. *Several* CABBAGES grow by the *Severn*.
8. He *ate* a PLUM in the *theaytre*.
9. This STONE tells the *nuns* when it is *noon*.
10. The *tenant* plants *ten* FERN(S).

Key words suggesting cardinal numbers.

1. Onion, only, onrush, Ontario, onward, won, wonder;

2. Teuton, toe, together, token, tomato, tool, Tudor, tuber, tune, tooth, tumult, tube;

3. Throw, thrown, thrift, treat, tree, treason, treaty, treacle, trefoil, triple, triangle, tray, try, tribe, tripe;

4. Foe, Faure, form, fort, fork, forest, forfeit, fore, forefoot, forgive, forget, formal, former, forward (*not* fortune!), fur, fir;

5. Fire, fife, fief, fern, flivver, dive, wife;

6. System, sit, site, situation, systyle, sick, Sikh (*not* Sistine or Sixtine!);

7. Sever, several, severe, Severn, Seville;

8. Ate, eat, (ĕt) late, mate, atone, abate, antedate (*not* attention!), state;

9. Nun, none, nonius, Nineveh, nonsense, *nein*, Niobe, ninny, nanny-goat, nincompoop, nunnery;

10. Tender (noun or verb) attend, attention, detention, retention, contention, tension, attenuate, Tenno, tensile, tentative, tenacious, tendency, tennis, tent, Tennyson, tenor, tense, tin, ton, den, dent.

11. Elephant, elevator, leaven;
12. Twins, delve;
13. Thermos, thermometer, bad luck;
14. Fortune; (1–4) one for;
15. Fiddle;
16. Sixtine, cistern;
17. Velveteen;
18. Aching, ātin';
19. Nankeen,
20 (2–0). Tent, to owe;
21 (2–1). Town;
22 (2–2). Tattoo, too-too, two toes;
23 (2–3). Tether, tooth;
24 (2–4). "Twofer," too far; tooffie;
25 (2–5). Tiffany,
26 (2–6). Too sick, tissue, 'tisick;
27 (2–7). Tinsel, to sever;
28 (2–8). Too late, to ate;
29 (2–9). Tannin, to nine;
30 (3–0). Thirsty, dirty, trio;
31 (3–1). Throne, thrown;

32 (3–2). Tree toad, thereto;
33 (3–3). Thither,
34 (3–4). Therefor, therefore;
35. Thief,
36. Thick,
37. Thistle,
38 (3–8). Theaytre,
39. Thunder.
40. Fort, for tea, pianoforte.

(Now make up a list containing at least two suggestive words for the cardinal numbers eleven to forty, inclusive.)

It is important that none of these words can be associated with any other number than its own; for instance Emerson's "fortify" for 40 belongs more properly to 45; I suggest fort; for tea; pianoforte.

The association may be

1. Repetition, as won for one, too for two, ate for eight;
2. Similarity in spelling of first part, as onion, for one;
3. Similarity in sound of first part; as fife for five, sick or Sikh for six;
4. Dialect:—pronunciation or brogue; as Irish tin for ten; French tree for three;
5. Thyme, as delve for twelve;
6. Foreign language word therefor; as German *nein* for nine;
7. Usual association; as "bad luck" for 13.

Now taking 16 words at random we will try to hook them to, or associate each with, its next in numerical order in the series, by making some sentence, absurd or other, connecting it with the "hook word:"—

1. Cat
2. Pie
3. Bull
4. Hat
5. Woodrow Wilson
6. Writing machine

7. Ring
8. Pencil
9. Locomotive
10. Snow
11. Watch
12. Pea soup
13. Curtain
14. Feather
15. Scissors
16. Flag

We make the following sentences:—

1. I saw a *cat* eating an *onion;* or the *cat won* the race against the dog;

2. A *pie* stuffed with *tow;* or I stubbed my *toe* against a *pie;* or the *pie* is *too* small;

3. I can *throw* the *bull* over the fence; or I saw a *bull* climb a *tree;*

4. My *hat* is trimmed with *fur;* or hang your *hat* on the *fir* tree, or on the *fore* mast;

5. *Woodrow Wilson* plays the *fife;* or *dives* from the Woolworth Building;

6. The *writing machine* works so hard, it makes me *sick;* or the *Sikhs* can't use the *writing machine;*

7. One should not wear *several rings* on one finger; he cast his *ring* into the *Severn;*

8. The ostrich *ate* my *pencil;* I bought this *pencil* in the *State* of Pennsylvania;

9. The *nun* drove the *locomotive;* the *locomotive* ran over a *nanny-goat;*

10. A *ton* of *snow* melts on the *tin* roof of my *tenant's den;*

11. The *elephant* wears a *watch; watch* your step when you leave the *elevator;*

12. The *twins* swim in *pea soup.*

13. The *thermometer* hangs behind the *curtain;* the *thermos* bottle is wrapped up in a *curtain;*

14. Those ostrich *feathers* cost a small *fortune;* there is *one for* (1–4) you;

15. He scratched the *fiddle* with the *scissors;*

16. The *flag* fell in the *cistern;* there is a *flag* over the picture of the *Sixtine* Madonna.

Now let us arrange the same words in the reverse order:

1. Flag
2. Scissors
3. Feather
4. Curtain
5. Pea soup
6. Watch
7. Snow
8. Locomotive
9. Pencil
10. Ring
11. Writing machine
12. Woodrow Wilson
13. Hat
14. Bull
15. Pie
16. Cat.

and connect them with the same hooks:—

1. Our FLAG *won* the prize for beauty;

2. I cut the *tow* (or my *toe*) with the SCISSORS; or the SCISSORS are *too* sharp for the child to have;

3. You cannot *throw* a FEATHER far; the FEATHER grows on a *tree;*

4. The CURTAIN is *before* the window; or is in the *fore* castle; or is trimmed with *fur;*

5. *Dive* in the PEA SOUP; you will find a *fife;*

6. The *Sikh* (or the *sick* boy) is proud of his WATCH;

7. The SNOW is *several* (or *seven*) feet deep;

8. The LOCOMOTIVE is in a terrible *state;* I *ate* a gingerbread LOCOMOTIVE;

9. The *nanny* goat swallowed my PENCIL; the *nun* blew out her brains with a PENCIL;

10. The Queen wears a *tin* RING; the RING weighs a *ton;* or was found in a filthy *den;* or belongs to my *tenant;*

11. The *elephant* can use the WRITING MACHINE; runs the ELEVATOR; eats *unleavened* bread;

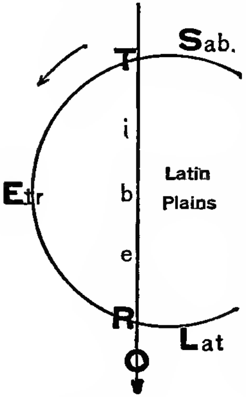
12. The first Mrs. WOODROW WILSON had *twins;* WOODROW WILSON *delves* in the fields;

13. I carry a *thermometer* (or a *thermos* bottle) in my HAT;

14. The BULL lost a *fortune* in Wall St. Is that a BULL? Buy *one for* (1–4) me.

15. The PIE man plays the *fiddle;* or hey diddle diddle, the PIE and the *fiddle;* the cow jumped over the moon;

16. The CAT fell into the *cistern;* the *Sixtine* Madonna has a CAT in her lap.



The initializing system uses real or artificial words the letters of which are those of the words to be remembered. The initializing system may be used in connection with others. For instance, about ancient Rome we have (see under "Peg or Anchor System") the diagram here shown and the word STEROL (suggested by contrast by the rich plain to the East of the Tiber).

The spectral color order may be kept in mind by the artificial words *vibgyor* or *roygbiu* (u = v):—thus

Violet
Indigo
Blue
Green
Yellow
Orange
Red

Red
Orange
Yellow
Green
Blue
Indigo
Violet.

The names of the nine muses are recalled by the proper name Puttkamer:—

Polyhymnia,
Urania,
Terpsichore,
Thalia,
KAlliope and Klio [1]
Melpomene
ERato.

An excellent example of initializing is given in Miles'

---

[1] Original Greek spelling; Calliope and Clio are latinized forms.

"How to Remember" for the 20 headings of the Causes of Rome's Success, namely:—

"State of the Age (backward), Absence of certain drawbacks;

"Geography and its influences; Mixture of Peoples in Rome; Etruscan Kings and their work;

"Gradual success by constant struggles Enemies and their weakness, and Rome's Luck; her policy of Isolating her subjects and enemies; her Treachery; her system of Alliances; her Extension of her Rights; her Roads; her capacity for 'Romanizing'; her Colonies;

"Her Senate; her Unity; the Character of the Romans; their Organization (in Law, in Arms, in Religion); the Family Life and especially the Father's power."

(Before judging of the merits of the system, try to memorize these headings without any system.)

But thinking of Rome as the centre of Italy, the central Gem of Italy, the Focus of Civilization, and then repeating a few times:

As gem creating focus we have the full list:—

(General)—

Absence of certain drawbacks;

State of the Age (backward—while Rome was a City-State);

(Geography and its effects)—

Geography (esp. geographical position of Rome);

Etruscan Kings and their work (e. g., the walls of Rome, and the Cloaca for draining and drying Rome);

Mixture of Peoples in Rome;

(The Romans dealing with other Peoples.)

Colonies;

Roads;

Romanizing Faculty;

Extension of Rights, slowly; and by a graduated System;

Alliances;

Treachery and "Diplomacy";
Isolating Subjects and enemies;
eNemies (their weakness and disunion and Rome's luck);
Gradual Steps (and constant struggle).

(The Romans themselves)—
Family Life (esp. Father's power in the Family);
Organization (the word *Oral*, again, suggests Religion, Arms, and Law);
Character (cp. Cato's Character);
Unity;
Senate's Government. We might add Slavery.

Observe how *N* for e*N*emies is an instance of "Substitution."

The localizing system calls for a picture, say, the room most familiar to the person wishing to remember a group of things:—The lecturer on Rome may wish to remember Geography—Etruscan kings—Mixed people—etc., as mentioned under "Link System." Through the window one sees a landscape (Geography comes to mind). On the mantelpiece one imagines an Etruscan vase; the door suggests the mixed people, etc.

The substituting system recalls digits by means of letters; and the converse. The letters by which to recall the numbers may be entirely arbitrarily chosen, as with a price mark (for instance):

B	L	A	C	K	S	M	I	T	H
1	2	3	4	5	6	7	8	9	0

C	L	E	A	N	S	H	I	R	T
1	2	3	4	5	6	7	8	9	0

but this makes difficulty in the matter of the vowels. Another method is to choose letters which by their number of strokes, or a real or fanciful resemblance in appearance, suggest the digits. Thus *t* or *l* is 1, *n* is 2, *m* is 3, on account of their respective number of down strokes; *w*, having four strokes, is 4; *v* is 5; *b* is 6, because when written it resembles a 6; *s* stands for 7; *h* for 8 because the German script *h* resembles an 8; the script *q* suggests 9, and *z* (for zero) or almost any other consonant not already used in the series, stands for 0.

Some use to represent the digits the first ten consonants of the alphabet—thus

B	C	D	F	G	H	J	K	L	M
1	2	3	4	5	6	7	8	9	0

as already mentioned under the head "Remembering Single Things."

Miles gives a method of combined linking and substituting, but does not give his entire key:—

The date 510 (Beginning of the Roman Republic) may be remembered by Beginning—Beggar—F o P S. where 5 = F, 1 = P, zero = S, and so on (the vowels not counting).

For 267 (conquest of Italy). Italy: Its a lie—I De N Y.

For 130 (addition of Spain, Macedon, Africa, Carthage, and Asia Minor to the Roman Empire) we have S M A C A M—smack 'em—smack the lips—luscious PeaCHeS.

Are memory aids injurious? Opinions differ. Some say that they have the same effect as high shoes have on ankles; others, that they act in the same helpful way as spectacles to the eyes. I agree with the latter.

Memory Training should be indirect, through the training of the apperceiving powers. One should not try to remember a thing, but to perceive it,

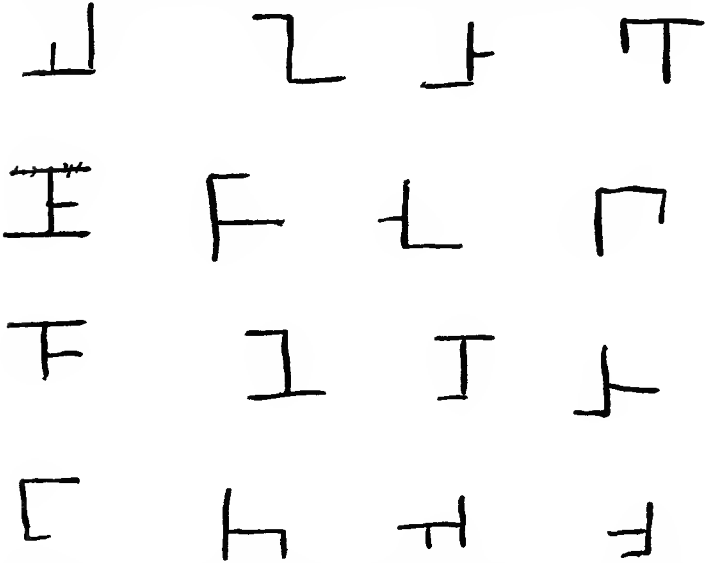
1. Just as it is,
2. In all its bearings.

When perception is

1. Accurate,
2. Comprehensive,
3. Independent,

memory will take care of itself.

Memory in general cannot be improved. We may strengthen our memory for dates by artificial aid, or by practice, but this will not help us to remember poetry; and so with all other kinds of memory. Like the muscles, each set must be strengthened by itself, by special exercises.



"Setting" the mind. The mind may be "set" like a machine, to permit certain associations, only. Thus the idea of six and two may be "set" for addition, as 6 plus 2 = 8; or for subtraction, 6 minus 2 = 4; for multiplication, 6 times 2 = 12; or for division, 6 divided by 2 = 3.

A good exercise in form memory is to note how many geometrical forms, such as the two sets here given, can be remembered and reproduced.

The efficiency or recall of an impression depends upon

1. Its depth, as influenced by
    - a. its force,
    - b. its frequency,
    - c. the mental vigor,
        - α. At the time of the impression,
        - β. At the time of the recall.
2. Association, through
    - a. contiguity in
        - α. Time,
        - β. Place.
    - b. comparison.

Frequency of repetition desirable. A sentence read once is soon forgotten; but that the associations are only partly obliterated is shown by the facility in relearning. If it was kept in mind the first time by ten repetitions, the second time might call for only eight, the third only six; and so on, in decreasing number.

Remembering, recollecting, and forgetting. Remembering is involuntary recall from sub-consciousness into consciousness. Recollecting is voluntary recall. Forgetting is always involuntary.

Forgetting. Despite our many exasperating experiences of not being able to recall things, probably nothing ever impressed on our mind is ever literally, wholly forgotten. Many things come up in spite of us; or are recalled in moments of danger. The memory of a frightful scene may be much more vivid than the impressions made thereby at the time.

Accurate vs. good memory. An "accurate" or "faithful" memory gives an image or idea nearly exactly like the original impression. A "good" memory retains well.

Kinds of erroneous memory. We may "remember" things which never happened, or mingle memories in ridiculous or impossible combinations.

Reading the number

31415926

to various persons, we may find the following kinds of errors:—

1. Transposition: as 31514926,
2. Omission: as 314926,
3. Interpolation: as 314159236,
4. Substitution: as 31415936.

Mental photography is an excellent exercise for the memory, consisting in glancing at a number of objects for a short time, then noting them on paper. No notes should be taken while they are visible. This exercise, used as a parlor game, also reveals much of the character of the participants—some seeing small jewels, others, writing implements, without noticing very much more conspicuous objects.

The practical application to the architect, the engineer, the merchant, the traveler, the soldier, the hunter, the physician, the detective, can hardly be estimated.

Testing the memory is effected by noting the time to commit by heart certain tasks—for instance nonsense verses, a row of figures, a piece of poetry, etc. A good exercise is the relation between the diameter and the circumference of a circle:—

3. 141 592 653 589 793 238 462 643 383 279 502 884 197 169 399.

How to retain instructions. After receiving instructions how to do a certain task, we must fix them indelibly in mind. To do this most efficiently, we must appeal to as many senses as possible at once. Thus, according to Stratton, an instruction card may be,

1. Read to oneself silently—(eyes, only, appealed to).
2. Read to oneself aloud—eyes and ears appealed to, and muscles used trained to repeat).

3. Read aloud to one—(ears, alone, used).
4. Read aloud to one and at the same time read silently to himself by the hearer—(eyes and ears employed).
5. Read aloud and at the same time copied (eyes, ears, mouth muscles and hand muscles used).
6. Read aloud to one while the process is demonstrated.
7. Read to one while the latter performs the process.

Lapses of memory come to every one. Every idea being suggested by some other, the last one can generally be recovered by going back a few subjects and following down the trail. (Insane persons cannot do it.)

The speed of forgetting diminishes with time. Thus if we forget 40 per cent of a matter after one hour, in the next we would perhaps have forgotten only the next 30 per cent; in the following, only the next 20 per cent; and so on.

Cramming may be either desirable or undesirable. It may be recommended

1. At the end of a course of study, to review and cement the parts,
2. For an examination consisting only of unrelated questions and which in itself has no future use.

Imagination is impossible without memory. The man who has never seen a tree or its graphical representation could not imagine a wood. No one who had never seen ice or snow, or pictures showing them, could imagine a typical winter landscape.

Hence the value of memory—it assists imagination. The more things we have seen, heard and felt, the more fertile our imagination.

Invention, being a form of imagination (often combined with analysis and synthesis) naturally depends on memory.

QUESTIONS 181 TO 200

181. How can memory guide our future conduct?

182. What is the difference between retention and recall?

183. Give an example of the effect of seeing a Zeppelin, on: a poet, a merchant, an Eskimo, and an aviator?

184. What kinds of ideas are best remembered by rote?

185. By logical memory?

186. What can you say of rote memory in connection with concentration?

187. If you had to learn a long poem "by heart" in a short time, how would you set about it?

188. A speech of your own composition?

189. A speech of some one else's composition?

190. How would you remember the names of the various men in a workshop?

191. The telephone numbers of a hundred customers?

192. Give three nouns suggested by the word "house."

193. Three verbs.

194. Three adjectives.

195. If you had to learn a speech *verbatim*, would you start in the morning or in the evening?—and why?

196. Why is it more difficult to repeat a series backwards than forwards?

197. Why are German or French words more readily learned by us, than Hungarian?

198. What are the three most important factors in association?

199. To be most effective, should repetition be continuous, or interrupted?

200. In what order should you commence strengthening your memory for various kinds of ideas, before you get old?

LESSON XI

REASONING, ETC.

While memory is in one sense our most valued possession, there is one faculty as yet unconsidered by us in these lessons, which is the distinguishing and invaluable characteristic of man, namely, the REASONING POWER. The beasts of the fields and the fowls of the air have memory, both conscious and subconscious; without it they would disappear from the face of the earth. They could avoid no danger, seek no shelter, take to themselves no food, that they had once known; but each day—each hour, their knowledge would fade away and leave them perpetual infants. But while they share with man this faculty, they lack, unless perhaps they possess it in very limited degree, our glorious attribute of reason.

Reasoning, judgment, argumentation and persuasion. Man is called the "reasoning being"; and certain it is that without reasoning and its kindred functions, Judgment, Argumentation and Persuasion, no man can be fairly efficient. He must be able to reason out methods of study and the best plan of action; the best means of scheduling and despatching, the proper incentive, etc.; to judge of what is right or wrong, profitable or unprofitable; in need, to argue his own point of view; in business to persuade his prospect that his offer is "reasonable."

Reasoning is finding relations between or among judgments; just as judgment is finding them between or among concepts. It acts by either,

1. Induction, or
2. Deduction.

The reasoning faculty is considered among the most valuable possessed by men; and a high degree of reasoning power as one of the best signs of a good, and especially of a well-trained, mind. No man who cannot reason well is of much use to himself or to others, except as a mere "hewer of wood and drawer of water." Even among laborers, reasoning lightens toil and lessens risk.

Reasoning, memory and imagination differ in their results:—thus (according to Pillsbury), among other differences:—

The results of	Reasoning	are	new and accepted as true
	Memory		true but not new
	Imagination		new but not true

To put it another way:—

Memory	results from	recognition and belief
Reason		belief without recognition
Imagination		lack of either recognition or belief

Characteristics of reasoning.

1. It aims at solving a problem,
2. It calls for a new solution believed to be true,
3. It results in a new and sufficient action,
4. The solution may be based on general principles or on experiences,
5. The solution may be applicable to either
    a. many cases or
    b. only a few, or any one.

It is problem solving, and must yield answers that are:

1. True,
2. Provable.

The steps in reasoning are:

1. Understanding the problem,
2. Developing the solution,
3. Proving the latter.

Deduction and induction. Deduction fits to the case an old, established, universally believed general principle or law. Induction proves by:

a. Reference to specific cases, or
b. Test.

Example of induction. "A died, so did B, C, D, E, F, and G; therefore Z will surely die."

Example of deduction.

1. All men are mortal,
2. B is a man; therefore
3. B is mortal.

Or it may be put:—

1. B must die some day, because
2. Every man must die some day, and
3. B is a man.

But here two things are necessary:—

1. The premises must be true;
2. The inference therefrom must be logical.

A universal law or statement based on induction must be the ground for all deductive reasoning.

Induction	**Deduction**
1. works from particular to general	1. works from general to particular
2. leads to	2. improves comprehension of the general
a. definition,	a. rule,
b. rule,	b. principle,
c. principle, or	c. theory.
d. theory.	
3. leads the way to new knowledge	3. does not add to knowledge
4. is the way to discover.	4. verifies and explains.

Inference calls for

1. Many suggestions of solution of the problem before one.
2. Separating the correct from the incorrect.

Reasoning, unlike inference, is not a straightforward process, because the premises are not always assumed to be given. Nor does it proceed by rule. It calls for seeking premises, and for knowledge concerning them. Often it recognizes a new situation as an example of a general principle, although no case may be recalled in which the principle was learned. Even the principle itself may be recalled as independent of the case in question.

Proof consists in getting the thinker, or a doubter, to believe something that is doubted. It may be either

1. Deductive, or
2. Inductive.

Judgment. We often say of a man: "He is very intelligent, but lacks judgment." This is just as though one would say of a horse: "He is very well built, except that he has only three legs." What is the use of one's remembering things, if one cannot judge between or among them? Of observing men and their actions, if one cannot judge concerning them?

Judgment and reasoning shade into one another. Reasoning is purposeful thinking, planned with the intention of carrying out some project, solving some problem, or overcoming some difficulty. Judgment calls for two or more ideas mentally united in meanings which assert either union or disunion of the objects referred to.

Sound judgments are those which are neither

1. Hasty,
2. Prejudiced,
3. Mistaken, nor
4. Illogical.

Observation and deduction. Observation alone will not result in efficiency; deduction from the results of the observation is essential. Newton was not the first who saw an apple fall; but the first who reasoned and announced why it fell instead of rising; and to state that the apple and the earth attracted each other in exact proportion to their respective masses, and moved towards each other in exact inverse proportion thereto.

Galileo was not the first who saw a pendulum swing; but the first to reason why it swung, and to announce that the period of swinging was as the square of the length between the point of suspension and the centre of gravity.

Franklin was not the first to observe the lightning flash; but the first to deduce the fact that it was an electric discharge, and to prove it by bringing some of the electricity down to earth by a kite string.

Judgments and propositions. A judgment exists in the mind. A proposition is its expression in words.

A judgment consists of:

1. Subject,
2. Predicate,
3. Copula.

A proposition contains:

1. } Two ideas.
2. }
3. Their mutual relation.

To judge (in the psychological sense) is to

1. Assert agreement or disagreement between two ideas.
2. Disover the relationship between two ideas.
3. Connect the two representations in a statement.

The result is a judgment.

Judging acts upon the materials submitted by either

1. Perception, or
2. Conception.

It consists of:

1. Comparison,
2. Decision;

and may or may not be followed by

3. Formulation and expression.

According to their complexity, judgments are either

1. Immediate or intuitive, or
2. Deliberate.

According to the process employed in reaching them, they are either

1. Analytic (clarifying our knowledge), or
2. Synthetic (increasing it).

Comparison usually depends on memory; for in most cases one has to compare the memory of one thing with the impression produced by another; and if there is a third, its impressions are compared with the memory of those produced by the first and the second. An exception may be where one compares the colors or the degree of brightness of two objects which are side by side, the weights of two objects held each in one hand, or the temperature of two quantities of water tested simultaneously with the two hands or the two feet. But in lifting two weights, one after the other, one must remember how heavy the first was in order to compare its weight with that of the second one. Matching colors by memory certainly depends on memory; so does striking the right note in singing, without accompaniment.

Premises and conclusions. Two persons may draw different (indeed, exactly opposite) conclusions from the same premises. For instance:—the German theatres give Shakespeare's plays oftener than do the English. One person concludes therefrom that the Germans have more literary culture than the English. Another merely sees that Shakespeare's plays are better than the German. A third concludes that the reason is that the English text is difficult to understand, because it contains many obsolete words; whereas the German translation is in excellent modern German, readily understood by the average citizen.

Examples of false logic.

1. All men admire strength.

2. This man is not strong.
3. Therefore, this man does not admire strength.
1. All men who have no cares are happy.
2. Slovenly men are careless;
3. Therefore, slovenly men are happy.

False deduction from undoubted facts was shown by the girl who in a ball game that went badly for the home team said: "Isn't our pitcher grand? He hits their bats, no matter where they hold them."

The following syllogism has been taken too often at a false value:

1. We need what we have not;
2. We have not industrial democracy; therefore
3. We need industrial democracy.

The "joker" lies in the fact that widely different, even contradictory definitions of "industrial democracy" are given by:

1. Trade unions,
2. Syndicalists,
3. Students of social tendencies,
4. Employers.

A suffragette said that New Jersey was an inferior State because it devoted only 12.6 per cent of its income to education. But Massachusetts, unquestionably our leading educational State, does not devote one cent to its universities, while Ohio, behind it in education, entirely supports one university and helps six others.

An Irishman said that he had been told at the previous election that if he voted for Bryan, business would be good; he did so, and business was good, so he intended voting again for Bryan.

At spiritual *séances*, the medium usually calls for a sailor to tie the knots. The dupes think that those tied by a sailor are the most firm and the least easily untied. But as a matter of fact, whenever a sailor makes a knot, he does so with the intention of undoing it some time, with ease.

A man contemplating a German bomb which had failed to explode, said: "To think that it had fallen all that way from the Zeppelin without exploding. Yet they say that the Germans make nothing but rubbish."

Intentional false conclusion.

Young lady:—"Stop that man; he wanted to kiss me."

Bystander:—"Never mind, Miss; there'll be another one along in a minute."

Illogical judgments may result from wrong comprehension of words. They may also come from mistaking the major for the minor premise; which is the reason why I devote space in these pages to logic, as such. The illogical man will always remain inefficient, and may be dangerous both to himself and to others.

Intuitive judgments are formed spontaneously and irresistibly, without employing either memory or reflection. They may be

1. sense formed
2. rational
3. moral

} perhaps the result of individual or race experience.

Mistaken judgments come from two causes:—

1. Too few facts on which to base correct judgment;
2. Illogical use of facts at hand, although they may be sufficient.

As an example:—a man is seen to leave the scene of a murder, bearing a bloody knife. Instead of being the murderer, he may have withdrawn the knife in the hopes of relieving the victim's pain; and may be going for a doctor, or a policeman.

Pope Nicholas' judgment was wrong when he accorded the Spaniards all east of a certain meridian, and the Portuguese all west thereof; because his knowledge of the facts was insufficient. He did not know that the two regions would meet on the other side of the globe.

Hasty judgments, or "going off at half cock," are usually the result of

1. Generalizing from too few examples, or
2. Being overconfident of one's ability to judge.

They are as great a hindrance to efficiency as vacillation in forming an opinion, or in acting on one.

Prejudiced judgments are made with the eyes blinded to the facts, or the logic, or both, in the case. The man who thinks "The king can do no wrong," "My father cannot err," "Americans are the smartest people on earth," "My country right or wrong," "*Vox populi, vox Dei*," and that sort of thing, can never be truly efficient, because, his eyes being blinded by a veil, he can see nothing clearly. In the last matter, for instance, the minority is more apt to be right than the majority, if it is a case for judgment rather than principle.

Causes of wrong judgment. Among these are:

1. Hazy ideas,
2. Haste,
3. Following another's dictum,
4. Prejudice.

Errors in judgment training.

1. Comparatively overcrowded memory,
2. Judgment precedes, instead of following, percepts and concepts.

Cultivation of judgment. Just as with our memory and our muscles, we may improve our judgment by constant and intelligent practice, and thus gradually increase our efficiency as to judging what is right and wrong, what is good and what bad mentally, and what is advisable and what detrimental physically. It is much more desirable to cultivate our judgment in these respects than merely in commercial matters, or in sports, or as to the weather, the crops, or politics.

Judgment of one's speech. Three questions should be asked before saying anything of another:—

1. Is it true?
2. Is it kind?
3. Is it necessary?

Persuasion. In few if any occupations or stations in life is the power of persuasion not highly useful. In some it is absolutely essential. The lawyer, the clergyman, the legislative representative, the diplomat, the salesman, the purchasing agent, (who really sells money for merchandize, and in some lines has hard work to make a sale)—the parent, the teacher, find it necessary to persuade some one as to the truth of a doctrine, the desirability of a course, the value of a quantity of merchandize or of a sum of money, etc. It is of little avail to have right and solid facts on one's side, unless one can prove this to the satisfaction of those who differ.

The rules, however, or the policy, leading to success in persuasion, are so nearly the same as those laid down by competent authorities in connection with argument, that I give these latter as nearly covering the ground; only adding that persuasion calls for milder presentation of the facts, than argument does. It may be *fortiter in re*, but it must be *suaviter in modo.* The iron hand may possibly be there, but certainly must be encased in a velvet glove.

Argumentation. Between this and persuasion there is a great gulf fixed. In arguing, however, we may say an actual opponent is implied; that an attempt is made to persuade the opponent by pure reason or weight of logic or fact; whereas persuasion, usually employed where resistance is absent or but slight, employs friendly devices, and appeals to motives—either better or worse. The lawyer *argues* with his opponent and tries to *persuade* the judge and the jury. The salesman employs persuasion more than argument; although logic plays an important *rôle*.

Successful argumentation does three things:—

1. Sets forth in a clear, convincing way what will establish the speaker's contention;
2. Uses convincing arguments in that contention;
3. Appeals to emotions strong enough to move the will of neutrals or opponents.

Golden rules in argumentation. Kleiser, in his "How to Argue and to Win," lays down the following rules, which I commend to the attention of all who wish to convince others of anything:—

1. Do not argue about everything;
2. Never belittle your opponent;
3. Control your temper;
4. Be impartial in your search for truth;
5. Seek to make a favorable impression;
6. Cultivate calmness and candor;
7. Do not resent opposition;
8. Avoid egotism;
9. Keep your eyes on all your company;
10. If you agree in part with an opponent, say so;
11. Do not be obstinate;
12. Let many trifles go unchallenged;
13. Be concise;
14. Hear others with patience, as you yourself would be heard;
15. Avoid high key;
16. Don't quibble;
17. Have a main point to prove;
18. Never fear to put the truth on trial;
19. Avoid generalization;
20. Look your hearer in the eye;
21. Do not argue with your hands;
22. Speak distinctly;
23. Avoid personalities;

24. Do not emphasize the obvious;
25. Define your terms;
26. Keep some ammunition in reserve;
27. Make a strong ending.

"Advocatus diaboli." In some debating societies, one person is chosen to attack a proposition or demand the punishment of a criminal, while another is appointed *advocatus diaboli*, or devil's lawyer. No exercise is better calculated to develop the judgment than to defend the wrong or the unpopular side of a question, knowing it to be wrong or unpopular, or both. It trains the mind to see questions from every possible standpoint, and makes one not only clearer in judgment, but less prejudiced and more charitable.

There is a story of an old lady who always had a good word for every one, no matter how bad. One of her nieces said of her: "I do believe Aunty would have a good word for the devil himself." Just then she entered the room, and some one repeated the remark. What was their surprise and amusement when she replied: "Well, if you all had a small share of his perseverance, it would be mighty good for you!"

QUESTIONS 201 TO 220

201. Of what use is the reasoning power to a merchant?

202. Give an example of your own making, of reasoning by induction.

203. By deduction.

204. What is the difference between the results of memory and those of reasoning?

205. Of imagination? Could you invent anything if you had lost your memory?

206. State in their proper order the steps in reasoning.

207. What do you think of the Scotch verdict "Guilty, but not proven"?

208. Make up a so-called "Irish bull," using false logic.

209. Are invention and discovery through *in*duction or *de*duction?

210. Which of the two would help you the more in comprehending the rule for extracting cube root?

211. In what ways can a judgment be unsound?

212. Was Franklin's proof that lightning was an electric discharge the result of *in*duction, or of *de*duction?

213. What are the three elements in a judgment?

214. What is the dependence of comparison on memory?

215. What are intuitive judgments?

216. Which sex relies largely on intuition, in judgment of men and things?

217. Where is the false logic in the familiar story of the Englishman who during his first hour in France wrote in his diary that all French waiters were red-headed and cross-eyed?

218. What effect can the cultivation of memory have on judgment?

219. Name six occupations in which the art of persuasion is essential.

220. What three things are necessary in successful argumentation?

LESSON XII

THE WILL

After studying the question of **Attention, Concentration** and **Perception** in our fourth lesson, we were compelled by the exigencies of attending in regular order to the twelve essential factors of efficiency, to let the matter of **Will,** like some others, wait for later solution. It comes very properly (as its definition in the next paragraph shows), immediately after the Lesson on **Judgment.** It constitutes a living force which often makes up for serious lacks in mental and moral make-up, and indeed carries the weakest physical frames through labor, conflicts and suffering, which would appall the most robust, and those most favored by environment and opportunity. Let us be thankful that if we have never possessed it, or if, having been endowed therewith by Nature, it has been "broken" by tyranny or contention against circumstances, it may be cultivated.

Definition of the will. The will is intentional mind action; the result:

1. Of all the conditions among which choice of action may be made;
2. Of the person's original nature, as modified by experience.

It is usually

3. The result of a judgment between or among courses, and often, of an internal conflict.

The strong will, seeing ahead, pushes forward vigorously; the weak one is short-focussed, readily swerved. The strong will itself is usually inherited; but the choice of the paths along which it may direct itself may be improved by education and experience. In other words:

1. The strong-willed man has inherited capacity, but may not have efficiency as the result of what may be said to correspond with motion studies in purely mechanical work; whereas,
2. The naturally weak-willed man may have schooled himself to overcome, by direction, the handicap of inherited weakness. His small-bore weapon, properly and timely aimed, may be more effective than a more powerful one, shot at random and at the wrong time.

Power of the will. Leland says: "The man who can develop his will has it in his power not only to control his moral nature to any extent, but also to call into action or realize very extraordinary states of mind:—that is, faculties, talents and abilities which he has never suspected to be within his reach." He adds:

"All that man has ever attributed to an Invisible World without, lies, in fact, within him; and the magic key which will confer the faculty of sight and the power to conquer is the Will."

The feeling of lack of will is old as mankind. St. Paul expresses it: "To will is present with me, but how to perform I find not."

The will in action. Having "a luminous idea," a "star of destiny," a "handwriting on the wall," as Gowin says, the will is automatically, auto-suggestively put and kept in action. But only if this luminous idea is backed by energy and full mental ability, may it be carried out. Otherwise, we have the painful spectacle, seen in almost any insane asylum, of men who imagine that they are Alexander the Great, the Pope, or Christ; of women who ape the air of command of Semiramis or Tsarina Catherine.

For the will to be properly set and kept in action are demanded:—

1. A set task,
2. A blocked retreat,
3. Faith in one's guiding star, and
4. A certain *élan;* all bound together by
5. Stern conviction, often amounting to fixed mania.

The set task. Bryan's set task seems to be the attainment of the Presidency of the United States. Long ago he "hitched his wagon to a star." That star failing him, he has hitched to others; but his set task remains the same.

The blocked retreat gives force to the will to "drive through." Efficiency is snatched from necessity.

At the battle of Cowpens, Morgan deliberately placed his troops with their backs to a broad river, so they could not retreat. He said that he would not for worlds have had a swamp near, for if they had, they would all have made for it the first thing.

The blocked retreat is best illustrated to-day by Germany. She feels that she must conquer, because she dare not retreat. She is like Hannibal, who burned his ships behind him.

Faith in self may be illustrated by a long range of leaders, from Mohammed through Napoleon and Grant to Theodore Roosevelt. We cannot imagine that either Bryan or Wilson has faith in self. The one changes his policy, the other calls in House. Bryan's faith is Barnum's: that the American people like to be taken in. Chatham and Pitt, Bismarck and Mohammed, Louis XIV and Webster, are examples of those who feel that they, perhaps they alone, can accomplish what they set out to do.

The impulsive temperament, backed by judgment and endurance, makes winners. He who cuts the Gordian knot, he who chops off the poppies' heads for an answer, gets and keeps the lead. The elder Diaz in Mexico had it. Napoleon III had not. Roosevelt has it. Buchanan lacked it.

Conviction. Jeanne Darc, Loyola, Knox, Luther, needed "neither argument nor reason" for "the faith that was in them." They *knew*. With them, conviction was firm and unconquerable.

The will concerns external actions and internal concentration. The will is to wish to do or have something believed to be attainable.

Desire underlies and procedes will; is a craving for some delight. It passes into will when there is a belief (either well-founded or unfounded) that attainment is possible.

It is or implies:

1. A feeling,
2. Recall or imagination.

Strengthening the will. The will may be strengthened principally by developing:

1. Forethought,
2. Attention,
3. Interest.

(As these are treated elsewhere in detail under separate headings, they need not be gone into, as such, here.)

Six means of training the will.

1. Supplying the mind with ideas,
2. Strengthening interest,
3. Directing attention to useful and worthy purposes.
4. Forming good habits,
5. Strengthening the imitative power,
6. Inculcating discipline.

How to train the will. This self-discipline—not self-punishment—consists in eliminating hesitation, and substituting therefor determination, as gradually accomplished through tasks constantly increasing in number, variety and difficulty, and calling for repression and self-denial, as practiced through judgment or common sense, and effort.

Ten essentials for developing will power.

3 H's	1. Habit,
	2. Health,
	3. High ideals.
2 A's	4. Action,
	5. Auto-Suggestion.
2 S's	6. Self-Discipline,
	7. Self-Assertion.
3 P's	8. Practice in Small Things,
	9. Positive Thinking,
	10. Positive Feeling.

Training the will, as taught by Barrett, is based on two principles:—

1. The will must be self-trained,
2. The exercises must require effort.

The process has three phases:—

1. Educative,
2. Curative,
3. Strengthening and perfecting.

The essentials are:

1. A quiet room,
2. A watch,
3. A note book.

The educative phase of will training may consist of the following exercises or of others suggested by the experimenter himself.

1. To stand on a chair for five minutes with arms crossed;
2. To repeat quietly and aloud: **"I will do this,"** keeping time with rhythmic movements of a stick or ruler for five minutes;
3. To hold hands upstretched for five minutes;
4. To walk to and fro in a room, touching in turn

say a clock on the mantelpiece and a particular pane of glass, for five minutes;

5. To keep eyes steadily fixed on a small object for five minutes;
6. To keep one hand in a basin of cold or hot water for five minutes;
7. To count and recount aloud some dozen small objects for five minutes;
8. To listen to a clock or watch making some definite movement at every fifth tick;
9. To get up and get down from a chair thirty times;
10. To read aloud, forwards and backwards, a paragraph from a book for five minutes;

These are all positive tasks. Negative ones—such as resolving not to step on a certain rug, or not to use a pencil—will suggest themselves, and are equally useful.

The curative phase of will training, that for restraining an impetuous will, may be carried out by performing the following Barrett "stunts," or others thought out by the person in question:—

1. To replace in a box, very slowly and deliberately, one hundred matches or bits of paper.
2. To write out very slowly and carefully, fifty times, the words: "**I will train my will.**"
3. To turn over, slowly and quietly, all the leaves of a book of about 200 pages;
4. To stand for five minutes in as complete a condition of lethargy and listlessness as possible.
5. To swing the arms over the head very slowly and deliberately for five minutes.
6. To watch the movement of the second-hand of a clock or watch; pronouncing some word slowly at the completion of each minute.
7. To draw parallel lines on paper, very slowly and painstakingly, for five minutes.
8. To count aloud slowly, up to two hundred.

9. To put on and take off a pair of gloves, or brush a hat, very slowly and deliberately, for five minutes.
10. To move a chair from one side of a room to the other, very slowly, for five minutes.

QUESTIONS 221 TO 240

221. Of what is the will the result?

222. Can a man have a strong will, and still be inefficient?

223. Is will inherited or acquired?

224. Can it be strengthened?

225. For the will to be properly set, and kept, in action, what factors are necessary?

226. Name three exercises in will training which you could carry out yourself without trouble or expense.

227. By what three things can you strengthen your will?

228. What are the three essentials of a short cut?

229. What is the advantage of a short cut in thinking?

230. Is intuition due to short cuts in thinking?

231. Divide 741888 by 64 the shortest way that you can.

232. Multiply 123474589 by 996, short way.

233. Divide 646317342864 by 998, short way.

234. How many dollars in 876543 marks? short way.

235. How many marks in $975432? short way.

236. What is the approximate diameter of a circle 246743 inches in circumference?

237. Give an example of double column addition of six numbers of six digits each.

238. Prove it by doing the work upside down.

239. Multiply 96 by 87 "Boston way."

240. Multiply 16352 by 235 and prove the work by "casting out the nines."

LESSON XIII

LOYALTY AND COÖPERATION

Loyalty and coöperation, while in some respects different, are also in many things similar; and education in and practice of either leads to increased appreciation and practice in the other.

By loyalty we mean hearty service in friendship or love; or to a leader or a cause; not merely service—to say nothing of eye service—but willing and hearty service; unremitting, unswerving.

Coöperation is working with one's superiors or associates, or with those under one's command or that of one's associates, with an eye single to the common weal.

Both loyalty and coöperation are constructive, not destructive. Both are opposed to hypercriticism, anemic action, and self-interest; in fine, to what is popularly known as "rocking the boat." Both are furthered by system and organization, as opposed to mere routine, but exist without either of these. Both may be either silent or expressed in words; but both call for manifestation by action, as opposed to mere acquiescence in policy and obedience to directions. Both are essential to maintenance of efficiency in any body; both aid in the attainment of personal efficiency in the members of that body; as in each member they eliminate—or at least lessen—friction and delay caused either by him or by others.

Where loyalty may be manifested. Loyalty may be manifested towards:

1. One's superiors.[1]

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[1] The words "superior" and "inferior" refer to an artificial relative position of human institution, as in the army or navy, an educational or a manufacturing establishment, etc.

2. One's self.
3. One's inferiors. (See note on page 179.)
4. One's country.
5. A cause.
6. A religion.

Loyalty to superiors. The Protestant Episcopal Catechism embodies an expression of what this means in its use of the words "my pastors and masters"; "pastors" in its figurative sense of "shepherds," and "masters," as implying those placed over one in any capacity —of government, family, religion, or service.

When the relative position is voluntary on the inferior's part, loyalty is doubly called for; when neither voluntary or involuntary, as in the case of the sovereign in a constitutional monarchy like Great Britain, it is still imperative, except for good and sufficient cause, and may be politic even when the subject is not completely satisfied—as is seldom the case—with his lot or position.

Bismarck, in discussing the German Kaiser's rescript in the *Reichstag*, replying to an attack of cowardice which he said was implied in the accusation that he shielded himself behind the Kaiser's name, added "it is only a feeling of loyalty that keeps me in my place; were the king mercifully to release me to-day, it would heartily delight me to bid you farewell, and see no more of you."

Of all people the Japanese have this quality in highest degree.

Loyalty to self. This means consistency in adherence to lofty ideals of thought and action. "To thine own self be true," is both wise, and universally and for all time applicable. The "*loi*" to which one swears and accords fidelity is the law of right, as made clear by enactment; but still more as laid down by conscience.

Loyalty to inferiors. The word "inferiors" is here to be understood as meaning the converse of "superiors," as above defined and treated. The "pastor" and "master," be he who or what he may, either assumes or has thrust upon him duties as well as rights. The British officer who leads his men "over the top," who with his back to the enemy calls out "Come on, boys!" and is first to cut the barbed wire, if he does not fall before reaching it, is more loyal to them than the German who addresses the backs of his command with "*Vorwærts!*" The officer who crawls out into "No man's land" and rescues a wounded private at the risk of his own life, is "faithful unto death" to his military children—knowing at the same time that his superior officers, from their own sense of loyalty to inferiors, demand and expect it of him.

Loyalty to country. Where "country" is not merely a geographical expression (as Italy was once said to be); where it is "*Vaterland*" or "Mother country" in the true sense, loyalty is at once a matter of fact, a duty and a cherished privilege. "My country, right or wrong" is its most outspoken expression; yet most vicious and to be condemned. It is of a par with "The king can do no wrong." And just as there have been more kings, from David down, who have been wrong at times, than those who have been right most of the time [1]—to say nothing of those who have been wrong most of the time—so loyalty to one's country should go only so far as "My country when right"; with the proviso: "when she is wrong she is to be put right."

In Cicero's oration against Catiline he said "mercy towards a traitor is an injury to the State."

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[1] One recalls the lines on King James:—

"Here lies his Majesty the king
  Whose word no man relies on;
Who never said a foolish thing
  Nor ever did a wise one."

Loyalty to a cause. The history of the abolition of slavery in the United States affords numberless examples of devotion to a cause, from the Quaker Thomas Garrett of Wilmington, who sacrificed two large fortunes in helping runaway slaves over the lines, to John Brown of Ossawattomie, who met the disgraceful but not disgracing death by hanging, and who replied to those who questioned him as to his object and his authority: "To free the slaves, and by the authority of God the Almighty." The "adherents" of "Charlie over the Water", stanch through years and misfortune, the present royalists of France, however misguided they may be, are examples of heroic devotion to a cause.

Loyalty to a religion. Since men began, as the Irishman put it, "cutting each others' throat for the love of God" (and that is a long way back in a sorrowful history) the greatest of all devotion has been that manifested in defence of an adherence to a religious belief. While the manifestations may have been frenzied or maniacal, or merely saintlike and submissive, they stand out over all others not merely in their firmness and obstinacy, but from the fact that loyalty was to something absolutely invisible, intangible and imponderable.

"That we devote ourselves to God is seen
In living just as tho' no God there were."
(Browning.)

Loyalty in the family. If we consider the family, we find loyalty to parents enjoined in the Decalog, while obedience of children to parents, which is one manifestation of loyalty, is commanded elsewhere in Holy Writ. We must, however, distinguish between mere blind and sullen submission to commands, caused by recognition of force or fear of popular opinion, and willing agreement.

A fine example of loyalty to ruler, family and caste was given by the Japanese lieutenant general Okubo Tsukumishi, who went from Paris to Tokio, at his emperor's command, and committed *hara-kiri*, because he had been adjudged guilty of being on the wrong side of politics. When I asked a Japanese why Okubo went 16,000 miles to do that, I was answered: "If he had not, his family would have been disgraced."

I fear that most of my readers would have sent for the family and stayed in Paris.

The spy's loyalty. We treat Major André's memory with contempt because he was a spy; but we should rather honor him as a loyal soldier, willing to risk his life and expose himself to hanging and misplaced loathing in the service of his king and country. In fact, we are apt to consider him as rather worse than the traitor Benedict Arnold; whereas the latter's crime of high treason was originally, under organized government, the highest crime a subject could commit. That André's king was insane and ill-advised does not alter the angle of view. André was loyal; we have no reason to consider him as anything but a patriot, until the contrary has been proved.

Loyalty and obedience. The extent to which loyalty calls for absolute, unquestioning obedience is sometimes open to discussion; and the answer to the question just how far it should be carried may depend on the particular line of activity, or on circumstances arising at the moment. On the one hand we have the printers' humorous motto: "Follow copy if it goes out of the window," on the other the sailor's, "In an emergency use your head." For loyalty may excuse and even call for direct disobedience. We have the story of Casabianca embodied in stirring verse; but no one could claim that the boy who "stood on the burning deck, whence all but him had fled" served any useful purpose thereby;

and no one could have accused him of disloyalty had he saved his life by obvious and easy means.

Loyalty and criticism. Due and proper criticism is not inconsistent with loyalty; but it must be manifested,

a. at the proper time,
b. in the proper place,
c. to the proper person,
d. in a friendly (i. e., strictly loyal) manner,
e. after due deliberation.

Of course there may be errors in loyalty and its manifestation. Wilkes Booth was loyal to a disloyal cause when he murdered Lincoln. There may even be an apology urged for Judas Iscariot, as being so loyal to his Christ, so firm in his belief in the latter's divinity and immortality, that he betrayed Him in full conviction that He would be victor over the forces of death, and in so doing would bring the world to the belief, the certainty, that He was the Son of God, and none other.

Loyalty and optimism. I have often expressed my definition of the true optimist as one who neither finds everything for the best, as optimists are popularly supposed to do, nor sees imperfection in all things, as pessimists are blamed for doing; but one who recognizes promptly, however regretfully, the many faults in most things, but knows and claims that most things are susceptible of improvement, whether radical, or only partial. And loyalty to either a person or a cause permits—in fact demands—just such an attitude. "My country, right or wrong" is as dangerous a motto, as "the king can do no wrong."

Between blind, literal obedience on the one hand, and entire independence of action on the other, without recognition of authority or desire for advice on the other, one may often find the *juste milieu;* yet there are cases where the two principles may not be combined.

Factors in coöperation. Coöperation implies not merely working together, but doing so

a. with a common object,
b. on a pre-determined plan of action,
c. (usually) in a pre-arranged organization,
d. with active interest.

Midway between active opposition and coöperation is mere indifferent collaboration.

The common object. This may be a religious movement, political upheaval, social betterment, industrial advancement, financial mastery, or independence; but be it what it may

a. the direction of coöperation should be clearly defined beforehand,
b. the extent should be limited to a certain maximum, or a definite minimum, or both.

The pre-determined plan. The formulation, in advance, of a plan of action, calls for

a. a definite schedule,
b. a practicable system of despatching.

The pre-arranged organization. Lincoln most wisely remarked, *à propos* of his re-nomination to the Presidency of the United States, "it is not wise to swap horses while crossing a stream." The dictum is not, however, infallible. There are cases where exchange is absolutely necessary; for instance, to carry out the metaphor, where the leading horse flounders or gets panicky. But such cases are usually the reason of either faulty organization system or improper choice of members thereof. In this war of nations the Germans, the French, the Russians and the British have changed their leaders, sometimes for apparent reasons; sometimes for causes not known and sometimes hardly hinted at among the "powers that be." In our Civil War we made many changes that were desirable and warranted; unfortunately many more that were due to political intrigue and mere personal jealousy.

Active interest. This factor should be considered as "going without saying," yet there is

a. mere passive coöperation; that friendly neutrality that may be helpful in that it removes so much opposition and shortens the firing line, and

b. active, militant coöperation, which declares itself in words and backs up its expressions by actions.

In reference to the first, it is not always appreciated—for instance in 1866 when Prussia, announcing to Hannover's king "whoever is not for us, is against us" defeated his army, annexed his territory, and deposed his person.

The Quaker who on hearing a number of persons express their sympathy for the family of a workman killed by accident, exclaimed: "I am sorry for him $5.00 worth. How sorry are you?" hit the nail on the head in giving a practical example of active, as opposed to mere passive, interest.

Coöperation among equals. The Mayflower passengers pledged themselves to frame for themselves "just and equal laws, and to hold to them all due submission and obedience."

Voluntary submission to self-imposed laws is one source of strength in a nation.

Coöperation in war. We have only to read the history of the present disastrous world war to see the harm brought about by lack of coöperation between the English and the French during the invasion of Belgium; and of the British army and navy in the Gallipoli *fiasco*. Coming nearer home, we have the baleful influence of lack of both coöperation and loyalty in the 3,000 strikes which have taken place in America during the last nine months of 1917; 64 of these costing a loss of 1,795,981 working days, or 6,000 years, of labor; 1,000,000 men having left work for longer or shorter periods of time. Kendreth, in "Collier's" for Jan. 12, 1918, shows that there had been, up to Nov. 1, 33 strikes on our cantonments; similar troubles delaying work on aviation fields, arsenals (particularly Watertown) naval hospitals (especially Chelsea) and navy yards; on the destroyer plants at Squantum and among the New Orleans and New York dock laborers; further, in copper and coal mines, steel and cloth mills, and shoe factories; in fine, in almost every branch of industry which was straining every effort to help carry on the war.

As I write this, Russia is serving as the "awful example" of lack of coöperation. The Bolsheviki, with no sense of proportion, have divided their country while an enemy is on their soil.

We need not, however, go so far afield. The Goethals-Denman controversy kept us back for three months in building much and instantly needed merchant ships.

Default of coöperation among the Allies has all along handicapped them in both defensive and offensive; our lack of coöperation with them is a still further hindrance.

Coöperation in politics. The spirit of fidelity, of intense loyalty to the lord, which characterized the old *comitatus*, passed over into the institution which took its place and became one of the features of the feudal system.

The French revolution was caused by lack of coöperation between the governing classes and the governed. At first the nation did not know what it wanted, nor how to get it. The French motto: "liberty, equality and fraternity" did not preclude lack of coöperation.

Our American revolution, on the contrary, started out with a very definite object and idea; and the coöperation of the colonies and of leaders of that time led to permanent success.

The intellectual movement of the 18th century, of which Voltaire was the spirit, was one of destructive criticism; scathing all sorts of abuses, beliefs and abnormalities in church, State and society, but acting as a free lance.

In 1792, France was declared a republic, but there were at once three political parties, which weakened her at that critical time. But while the Third Estate was organized, the other two were not; and in the deadlock which ensued in 1789 the former conquered.

One of the weaknesses in all French governments before Napoleon was the divided condition of the Church; in 1801 he made the *Concordat* with the Pope—the term implying coöperation.

One step in the development of the American Constitution was the voluntary surrender of arbitrary power by the sovereign people; even denying to the majority the exercise of such power; "surrender of will to reason, of private interest to public good, of the individual to the State as the institution of organized justice" ("Americanism and What it Is").

Coöperative credit. The world in general, and our own country in particular (more especially our agricultural industries) need handier and more accessible credit; not ordinary consumers' credit, without which, although it often merely bolsters up improvidence, the wheels of commerce and industry would stand still; but one which will discourage, discredit and help prevent that evil. It should be not merely protective, but productive; not merely for the rich, but for the poor; not merely for a given term, but with an elastic limit. Such credit can come only by coöperation, not merely for a short time, but for a long period.

Farmers in particular can obtain—have obtained—such credit (as wages owners have obtained it by their building associations) by coöperation. The French farmers of Brie, by organized coöperation, find $64 per acre sufficient for business purposes, whereas in other districts without coöperation nearly double is necessary.

The two factors on which such credit can be based, are (a) trustworthiness of the debtor; (b) prompt, thorough, practical employment of the loan for the purpose demanded, and that only.

Such credit must guard the interests of the lender equally with that of the borrower. Practically the only hard and fast rule which may be laid down in connection with coöperative credit is that while the organization may lend only to its members, it should preferably borrow also from non-members. In principle, the Raffeisen banks [1] have no shares, and no entrance fees are necessary, although they may have such should they wish; but in fact in Germany and in Austria they have had share holding forced upon them. They imply unlimited financial liability and equally unlimited confidence in human nature. In Germany they usually call for peasant proprietorship; but the Spanish *positos*, the Italian *monti frumentare* and the East Indian *sharma gola*, do not. Membership in one precludes absolutely membership in another, as this would correspondingly lessen the liability of each person belonging to two such institutions. Commencing with a coöperative bakery, Raffeisen next attacked usury, especially in the cattle trade.

Admission to such a bank must be with members' consent; and liability being unlimited and checking mutual, scrutiny as to character, habits, opportunity and business ability is all the more strict. The same fact calls for and attains severity in weighing the qualifications of officials.

Obstacles to coöperation. Among the obstacles to world organization—i. e., to international coöperation and world efficiency, are dynastic interests, racial peculiarities and animosities, sullen memories of past injuries, and rivalries of factions and distance. Among the hindrances to personal coöperation and efficiency are jealousy, self-interest, tradition, ignorance, and religious animosities. When—or if—all these disappear, we may hope for perfect individual coöperation and highly increased personal efficiency.

---

[1] Evolved while Rheinland was French.

The limits of coöperation. Just where coöperation in business and in politics leaves off, and trusts in the one and rings in the other commence, is at times difficult to determine. We have for instance on the one hand our Sherman law, which absolutely prohibits coöperation in certain industries within our boundaries, and on the other an Act of Congress (Webb's) which permits it in export matters.

Rivalry vs. Coöperation. The best concrete example of rivalry, the reverse of coöperation, as treason is the reverse of loyalty, is afforded by our neighbor republic, concerning which David Jayne Hill says, in his "Americanism: What it is."

"We have at the present moment a startling example of this assertion of arbitrary will and repudiation of public authority in our nearest neighbor to the south. Everyone who personally knows the Mexican statesmen of the highest type appreciates their learning, their culture, and their sometimes great executive ability. What is lacking to that country? It is the spirit of personal renunciation of arbitrary power in the interest of the public well-being. Rich in natural resources, situated in a most favorable geographical environment, and not wanting in capable men, Mexico is doomed to stagnation, poverty and discredit because it is the prey of rival forces within the State, each claiming the right to rule, each determined to destroy the others."

Another excellent example in the past, was the conflict, happily long gone by (and it is to be hoped never to be repeated) between the States of our own country. Coöperation between North and South, as between East and West, has been rendered more possible by increased homogeneity of population and identity of interests. Our present danger of lack of coöperation lies along class, rather than geographical, lines.

Examples of coöperation. The old fable of the bundle of sticks which could not be broken as such, because of the bond, applies now as aptly as in the old Roman days, when it appeared in the lictor's paraphernalia; and is embodied in our present motto: "in union there is strength."

The staff of Schwab, the steel king, is one of the best modern examples of coöperation among members chosen for personal efficiency, and characterized by loyalty to their chief and to the vast interests which he controls through them.

We may even pursue the likeness between coöperation of nations and that of individuals into that among the various members of the actual physical body. The brain is inefficient unless it receives good red blood through the coöperation of the lungs; these again call for coöperation of the digestive tract in furnishing liberal supply and normal quality of the life fluid; and among the various organs of that tract, constant and perfect coöperation is called for; even these organs demand the coöperation of the teeth and salivary glands.

We have not yet learned to act together. Our work is largely, as Emerson says, like "the wavering motion of a baby's arm before he has learned to coördinate his muscles."

Conflict between loyalty and coöperation. Occasionally two persons may be loyal to a common cause, yet fail to coöperate, because each has his theories as to how that cause may best be subserved; or the one may desire to appear the more useful of the two in his services, and the more profitable in their results.

I may instance the motive power and the permanent way of departments of a railway. The one desires the driving-wheel and other tires to be harder than the rails—in fact, just as hard as consistent with safety, in order to keep down the maintenance expenses of his department. The other, with the same object, strives to have the rails so hard, up to the limit of brittleness, as not to be worn excessively by the wheels. Which plan should be followed must be determined by the cost accountants, with due consideration of the question of safety.

So long as human nature is both human and natural—i. e., probably until the sun grows cold—this uncoöperative loyalty will exist.

The history of every war, civil or other, and of every great popular movement, shows where loyalty and coöperation have advanced the cause; while lamentable instances in military and civil history stand forth and show where delay, loss, and even wreck have ensued from treason, jealousy and bickering.

True loyalty and coöperation call for each one's doing not merely "his bit" but more than his "bit." Sacrifice in war time calls not merely for giving up luxuries and unnecessary things, but for "taking in the belt until it pinches."

QUESTIONS 241 TO 260

241. Define loyalty.

242. Define coöporation.

243. To whom and what can loyalty be manifested?

244. What nation shows loyalty in the highest degree?

245. Where and how should criticism be manifested, so as not to conflict with loyalty?

246. What are the factors in coöporation?

247. Give recent examples, other than those which I quote, of the bad result of lack of coöperation.

248. Block out a system of coöperation among farmers, with respect to disposing of a common product.

249. On what basis would you organize a building and loan association in a large city?

250. Name four obstacles to international coöperation.

251. Name two Americans, both loyal, who do not coöperate in defending our country.

252. How do the salivary glands coöperate with the ducts secreting gastric fluid?

253. For what does coöperation in war time call, from us?

254. Name two departments in our national Government, that do not coöperate.

255. Name two departments in some American city, that do not only not coöperate but actually hinder each other.

256. Name the European country in which lack of coöperation is most marked.

257. How far do and should coöperation and personal liberty conflict?

258. Give an example of good coöperation among the various members of a family.

259. Sketch out a plan for coöperative purchase, by families, of articles of food.

260. Sketch a plan of coöperation among municipal governments, to reduce and keep the number of unemployed to a minimum.

LESSON XIV

SHORT CUTS

Short cuts save our most valuable commodity—time. Rockefeller has not one minute more daily time income than the poorest immigrant. But all short cuts are not time savers. A short cut in a strange land may plunge one into a bog or off the edge of a precipice. To make a short cut, one must either know the territory, or be master of woodcraft; which latter is gained by study, experience and counsel.

Three essentials of a short cut are that it must be,

1. The best that is easy and quick,
2. The easiest that is good and rapid,
3. The fastest that is good and easy.

In other words, it must be

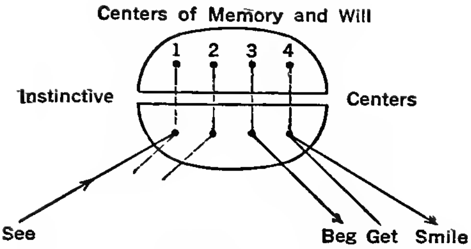
1. Excellent,
2. Easy,
3. Practical

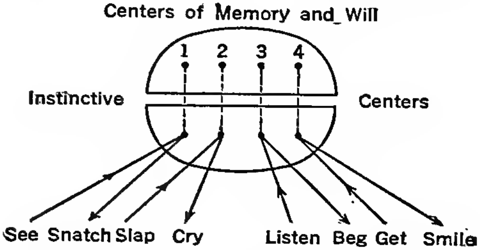
in the best possible combination.

What is a short cut? A short cut may save either distance, or time, or both.

The royal road to learning. The old saying that there is no royal road to learning is not true. There is. But it is not *for* kings; it is built *by* the princes of labor and learning, for every one to use.

Short cuts in thinking are entirely different from short methods of learning or doing things, as committing dates or poetry to memory. William James shows a short cut in the brain itself, as follows:—





A child tends to snatch at what pleases it, to draw back his hand if slapped, to cry if hurt by the slap, to smile if addressed gently, and to imitate gestures.

You offer it a sweet. He snatches for it. You slap the hand. It withdraws the hand and cries. You offer the sweet and say: "Ask nicely; say 'Please.'" He stops crying, imitates you, gets the sweet, and crows or smiles for pleasure. The next time he cuts out the natural reaction of snatching and its accompanying results, and substitutes begging. The impression "see" awakens a chain of memories; and the only reactions this time are "beg" and "smile."

The child has learned a short cut in thinking.

"The one right way." We are often told that there is but one right way of doing a given thing. This is simply not so. There might be a dozen right ways, and only one wrong, or the other way about. One might as well say that there was but one railway between New

York and Chicago. Which one to take depends on circumstances which change from day to day, and with different persons. The study of the science of efficiency teaches us to choose and use the way which is best adapted to the conditions of time and person. What is the easiest way for one may be only the second easiest for another. Any oarsman will tell you that.

Overhaste. In learning and making short cuts we must avoid overhaste. There are times when short cuts are absolutely unnecessary—as for instance making one to catch a train that in no case will start until long after arrival by the longest way would have been in time.

Following give illustrations of a number of short cuts in simple mathematical operations:—

To multiply by 25:—Add two noughts and divide by 4.

4) 62394700
$15598675 = 25 \times 623947$

To multiply by 12½ = 12.5:—Add two noughts and divide by 8.

8) 749183600
$93647950 = 12\frac{1}{2} \times 7491836$

To multiply by 6¼ = 6.25:—Add two noughts and divide twice by 4.

4) 3297500
4) 824875
$206218\frac{3}{4} = 6\frac{1}{4} \times 23975$

To multiply by $33^{1}/_{3}$:—Add two noughts and divide by 3.

3) 926514400
$308838133^{1}/_{3} = 33^{1}/_{3} \times 9265144$

To multiply by $16^{2}/_{3}$:—Add two noughts and divide by 6.

6) 3141592600
$523598766^{2}/_{3} = 16^{2}/_{3} \times 31415926$

To multiply by any factorable number:—Multiply successively by its factors. Thus:—

To multiply by 64:—Multiply twice, hand running, by 8.

422693
3381544
27052352 = 64 × 422693

To multiply by 72:—Multiply by 8, then by 9.

18784928
150379424
1353254816 = 72 × 18784928

To divide by 25:—Point off two figures and multiply by 4.

1353254.81
4
5413019.24 = 135325481 ÷ 25

(10 figures instead of 34 in the work.)

To divide by 12½ = 12.5:—Point off two figures and multiply by 8.

696973.42
8
5575787.36 = 69697342 ÷ 12½

(10 figures instead of 56 in the work).

To divide by 6¼ = 6.25:—Point off two figures and multiply twice by 4 hand running.

55556923.42
222227693.68
888910774.72 = 55556923.42 ÷ 6¼

(22 figures instead of 79 in the work.)

To divide by $33^{1}/3$ = 33.3333:—Point off two figures and multiply by 3.

62918.76
188756.28 = 6291876 ÷ $33^{1}/3$

(8 figures instead of 102 in the work.)

To divide by $16^{2}/_{3}$ = 16.67:—Point off two figures and multiply by 6.

191632.03
1149792.18 = 19163203 ÷ $16^{2}/_{3}$
(9 figures instead of 104 in the work.)

To divide by any factorable number:—Divide by its factors, hand running:—

8) 6472982348
12) 809122793.5
67426399.459 = 6472982348 ÷ 96
(13 figures in the work instead of 65.)

To multiply by 99:—Add two ciphers and subtract the original number.

645063200
6450632
638612568 = 6450632 × 99
(9 figures instead of 18 in the work.)

To multiply by 998:—Add three noughts and subtract double the original number.

647612568000
1295225136
646317342864 = 647612568 × 998
(13 figures in the work instead of 33.)

The application of this principle to such multipliers as 993, 1996, etc., is evident.

To reduce marks to dollars at par ($1.00 = M 4.20; M 1. = $0.238).

Divide by 6 and 7 successively.

6) 62664 marks
7) 10444
$1492 (No error)

To find the approximate perimeter of a circle multiply the diameter by 22 and divide by 7.

	Short way	Exact way
Diam.—	15.924	15.924
	31.848	31416
	350.328	95544
Perim.—	50.044	15924
		63696
		15924
		47772
		50.0268384

(Error, 0.0171616 = 0.0343 of one per cent or about $\frac{1}{3000}$ of the exact amount.)

To find the diameter of any wheel, circular sectioned shaft, etc., mark off on a tape measure lengths of 3.14 inches and number them 1, 2, 3, etc. Wrapping this about the wheel or other object, the diameter in inches will be given by the graduations.

Reverse addition.

46292	21	sum of col. 1
34596	28	2
98763	23	3
34688	40	4
26384	23	5
240723	240723	

Custom house addition.

$674.32	25	= sum of col. 1 from right
1921.16	15	2
429.26	24	
9874.35	19	
6216.66	29	
	16	
$19115.75	$19115.75	

Double column addition.

439229	28 = sum of col. 1 from right
196741	40 = “ “ “ 2 “ “ + 2
324666	40 = “ “ “ 3 “ “ + 4
187892	29 = “ “ “ 4 “ “ + 4
141592	36 = “ “ “ 5 “ “ + 2
672888	19 = “ “ “ 6 “ “ + 3
1969008	

Sum = last figures written plus right-hand figures, running upwards.

46292	23 = sum of col. 1 from left
34596	42 = “ “ “ 2 + 2
98763	27 = “ “ “ 3 + 4
34688	30 = “ “ “ 4 + 2
26384	24 = “ “ “ 5 + 3
240723	

31253	21
42156	35
36294	21
34685	23
98763	24
243151	

34932	
43716	
14921	
80479	174048 sum of top part.
13972	
69865	
34186	
48795	166818 sum of bottom part.
340866	340866 sum of sums.

		Sums of digits in	
	row	col. 2	col. 3
546312	21	3	3
725733	27	9	9
446859	36	9	9
324632	20	2	2
256398	33	6	6
334694	29	11	2
856659	39	12	3
3491287			34

Sum of digits in sum 34.

(Col. 2 need not to be set down.)

Addition can also be proved by adding from above downwards instead of from below upwards.

Multiplication by factoring.

9932 × 64 (i. e., × 8 × 8)
79456 = 8 × 9932
635648 = 8 × 79456

2316 × 56 (i. e., × 7 × 8)
16212 = 7 × 2316
129696 = 8 × 16212
or
18528 = 8 × 2316
129696 = 7 × 18528

Boston multiplication. Where one number is factorable, divide it by a factor and multiply the other by that factor; multiply the results:

14 × 37 = 7 × 74 = 518
35 × 1162 = 7 × 22310 = 156170

Excess method of multiplication.

123 × 104

123
104
92 = 23 × 4
127 = sum less 100

12792

112
106
Sum less 100 11872 12 × 6

1213
1003
Sum less 1000 = 1216639 213 × 3

Mean method of multiplication.

Multiply 39 by 41
Mean = 40
40 × 40 = 1600
1 = square of diff. between each and 40

1599

43 × 57
50 × 50 = 2500
49 = square of diff. between each and 50

2451

105 × 95
100 × 100 = 10000
25 = 5 × 5

9975

Square multiplication (to be done mentally).

27 × 27

400 = 20 × 20
280 = 2 × 20 × 7
49 = 7 × 7

729

49
49

1600 = 40^2
720 = 2 × 40 × 9
81 = 9^2

2401

Cross multiplication (to be done mentally).

27 9
26 8
9

400 = 20 × 20
120 = 20 × 6
140 = 20 × 7
42 = 7 × 6

702

94 — 13
83 11

7200 = 90 × 80
270 = 90 × 3
320 = 80 × 4
12 = 4 × 3 17 –

7802

Proving multiplication by unisates.[1] (Also called "casting out the nines.")

3493 = 19 = 10 = 1
243 = 9 = 9

10479 9
13972
6986

848799 = 45 = 9

---

[1] The unisate of a number is the sum of its digits reduced to a unit.

Shortening division. Place the divisor at the left and the quotient thereunder. This will save space and make multiplication more convenient.

$$\begin{array}{lrl}
\text{Dividend} & 154329 & \\
& 1317 & \\ \cline{2-2}
& 2262 & \\
& 2195 & \\ \cline{2-2}
& 679 & \\
& 439 & \\ \cline{2-2}
& 240 & = \text{rem.}
\end{array}$$

439 = divisor
351 = quotient

To divide by a number a little in excess of 100, 1000, etc.

1. Cut off from the right as many digits as there are noughts in 100, 1000, etc.; using a long vertical downward line.

2. Multiply the figures to left of the line by the difference between 100, 1000, etc., and the divisor; subtract product from dividend.

3. If any digits of the remainder come to left of line, multiply them by the difference figures (adding any figure carried from the remainder to the quotient) and add the product to the remainder. Continue these alternate operations if necessary. When the last product figure or carried figure to left of line is brought to the right by multiplication, the quotient will be to left, the remainder to right, of the line.

$$\begin{array}{lr|ll}
\text{Divide} & 187 & 832 & \text{by } 1007 \\
& 187 & 832 & \\
\text{less} & 1 & 309 & = 7 \times 187 \\ \cline{2-3}
\text{Quotient} = & 186 & 523 & \\
\text{plus} & & 7 & = 7 \times 1 \\ \cline{3-3}
& & 530 & = \text{remainder}
\end{array}$$

$$\begin{array}{lr|l}
 & 549 & 263 \text{ by } 1009\\
 & 4 & 941 = 9 \times 549\\
\cline{2-3}
\text{Quotient} = & 544 & 322\\
 & & 36 = 9 \times 4\\
\cline{3-3}
 & & 358 = \text{remainder}
\end{array}$$

$$\begin{array}{lr|l}
\text{Divide} & 3509 & 615 \text{ by } 1012\\
 & 42 & 108\\
\cline{2-3}
\text{Quotient} & 3467 & 507\\
 & & 504\\
\cline{3-3}
 & 1 & 011 = \text{remainder}
\end{array}$$

$$\begin{array}{lr|l}
 & 535 & 627 \qquad\qquad 1009\\
 & 4 & 815\\
\cline{2-3}
\text{Quotient} = & 530 & 812\\
 & & 45 = 9 \times (4 + 1)\\
 & & 848 = \text{remainder [1]}
\end{array}$$

To divide by a number a little less than 100, 1000, etc.

1. Same as 1, under preceding rule.

2. Multiply the digits to left of vertical line by the difference number; set product under dividend.

3. Multiply any part of this product lying to the left of the line by the difference number; put product under the previous ones. Continue this multiplication until no number remains to left of line.

4. Add the several results. The quotient will be to left, the remainder to right, of line. (Do not forget to multiply the figure carried, if any, from the remainders to the quotients, setting the product in proper position and adding it.)

---

[1] Because in the subtraction there was one to carry.

$$\begin{array}{lr|l}
\text{Divide} & 4789 & 365 \text{ by } 993 \\
 & 33 & 523 = 7 \times 4789 \\
\cline{2-3}
 & & 231 = 7 \times 33 \\
 & & 7 = 7 \times 1 \\
\cline{2-3}
\text{Quotient} & \multicolumn{2}{l}{4823;\ 126 = \text{remainder}}
\end{array}$$

$$\begin{array}{lr|l}
 & \multicolumn{2}{l}{641458207 \div 9930} \\
 & 64145 & 820|7 \\
 & 449 & 015 = 7 \times 64145 \\
 & 3 & 143 = 7 \times 449 \\
 & & 21 = 7 \times 3 \\
\cline{2-3}
 & 64597 & 9997 \\
 & 1 & 9930 \\
\cline{2-3}
\text{Quotient} & 64598 & 0067 = \text{remainder}
\end{array}$$

Stenographic short cuts. The stenographer who has a regular line of work, as law, medicine, export business, or manufacturing, uses many words and even phrases repeatedly; and for these he should invent empirical signs which cannot be mistaken for anything else; i. e., they should absolutely not suggest any character in the system of shorthand which he uses. As examples, the signs of the Zodiac and other astronomical signs, and letters of the Latin, Greek and Hebrew alphabets:—

In reply to your letter of 16th inst. ♂ 16
" " " " " " " ult. ♀ 16
Price c. i. f. Hamburg, terms 30 days α 30
" f. o. b. " " " " β 30
" c. i. f. Bremen " 60 " γ 60

Type-writing "stunts." There are typists and typists. Those of one class are inventors, of the other, only "plugs." The inventors, who are always originating short cuts, better methods, and little economies, advance in usefulness and salary. The others just plug along and never get a raise.

Among these stunts may be mentioned proper methods of placing the paper so as to avoid unnecessary motions in putting it properly in the machine; having a backer sheet on the roller so that its free end will catch and draw in the top of the sheet to be typed, and marking thereon the roller position for inserting the paper and starting the writing; making dollar marks by striking first a capital S and then a straight line through it before the carriage has time to advance a space; having an extra space-ratchet wheel with a few more teeth so as to give a line distance between the ordinary single and double spacings; making three or four copies of a form letter at once and filling in the addresses of the top copy with the ribbon and those of the under ones with carbon paper laid on the ribbon; strengthening copies from old carbon by putting one under and one over the "flimsy" to be written on; turning an old ribbon and using the under side; rolling an over-inked new ribbon tightly with a used one, to average the amount of color on both; addressing the envelope by the use of carbon at the same time that the letter is written; counting words by the running or square inch, or even by weighing the sheets, after getting a good average.

ENVOI

We have now traversed together the first portion of the path which leads to Efficiency. I have called your attention to the landmarks along the way; but in future you must be left largely to your own devices. Under way you have, I hope, used your own God-given senses to note, and your equally God-given memory to remember, the incidents of the journey, as well as the noteworthy structures along the road. I trust that you now appreciate the forces with which you have been endowed, keep your ideal ever clearly in mind, direct and concentrate your perception and attention on that ideal, with the intention of analyzing all the problems which present themselves, and making intelligible, permanent and comparable records of the results of your researches and investigations as to men, matter and methods. You will then have been able to fix standards of achievement, with the intention of raising them from time to time, as your capacity keeps step with your efficiency. To attain these standards you must necessarily have formed plans; you must keep on planning—letting the past be your guide in the present, as to your achievements in the future.

You have, I hope, learned self-discipline, which is the surest way to secure discipline in others over whom circumstances may have placed, or will place, you. As to your incentive to work and progress:—while the completion of the work, the making of progress, and the striving towards your ideal, should in themselves be powerful incentives, you have probably some other one in view, sufficiently attractive to keep your forces ever spanned and your look ever ahead.

If you have already attained some degree of efficiency, and are in the way of becoming more and more efficient each day, so that you will be of increased use to yourself and those about you, as well as to your country and the world at large, I shall be most happy.

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